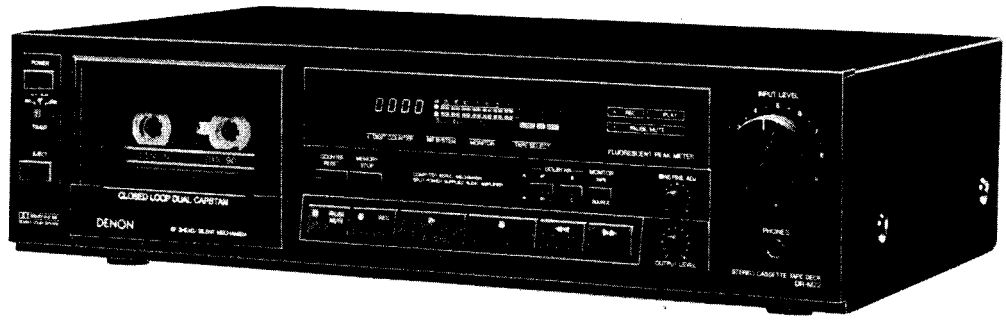
DENON

Hi-Fi Component

SERVICE MANUAL

STEREO CASSETTE TAPE DECK

MODEL DR-M22



NIPPON COLUMBIA CO., LTD.

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FEATURES

- Computer-controlled servo technology
  - Closed-loop dual-capstan tape transport.
  - Silent, soft-touch controls provide maximum ease-of-use.
  - Computer-controlled, full-logic tape controls enable fool-proof operation.
- Three-head design utilizes DENON's new SF record/playback combination head assembly.
- Computing tape counter with 4-digit readout and memory stop.
- Dolby-C noise reduction systems (Double Dolby System).
- Extended range, dual-color fluorescent peak meters.
- Auto tape selector.
- High-grade 5-pole DC reel drive motor.
- Recording Bias adjustment.

SPECIFICATIONS

• Type	Vertical tape loading 4-track 2-channel stereo cassette tape deck
• Heads	SF Record/Playback combination head x 1 Erase head (Ferrite) x 1
• Motors	Electronic servo DC motor (for capstan) x 1 5-pole DC motor (for reel winding) x 1
• Tape Speed	4.8 cm/sec.
• Fast forward, rewind time.	Approx. 90 sec. with a C-60 cassette
• Recording bias	Approx. 105 KHz
• Overall S/N ratio (at 3% THD level)	Dolby C NR on ... more than 73 dB (CCIR/ARM)
• Overall frequency response.	30~19,000 Hz ±3dB (at –20 dB METAL tape)
• Channel separation	More than 40 dB (at 1 KHz)
• Crosstalk	More than 65 dB (at 1 KHz)
• Wow & flutter	0.045% wrms
• Inputs	
line	77.5mV (–20 dB) input level at maximum Input impedance: 50 Kohm unbalanced
• Outputs	
line	775mV (0 dB) output level at maximum (with 10 Kohm load, recorded level of 200 pwb/mm)
Headphone	1.2mW output level at maximum (optimum load impedance 8 ohm ~1.2 Kohm)
• Accessories	Parallel pin cord x 2
• Power supply	50 Hz/60 Hz compatible, voltage is shown on rating label
• Power consumption	19W
• Dimensions	434 (W) x 115 (H) x 286 (D) mm
• Weight	5.6 kg

■ **Above specifications and design styling are subject to change for improvement.**

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WARNING:

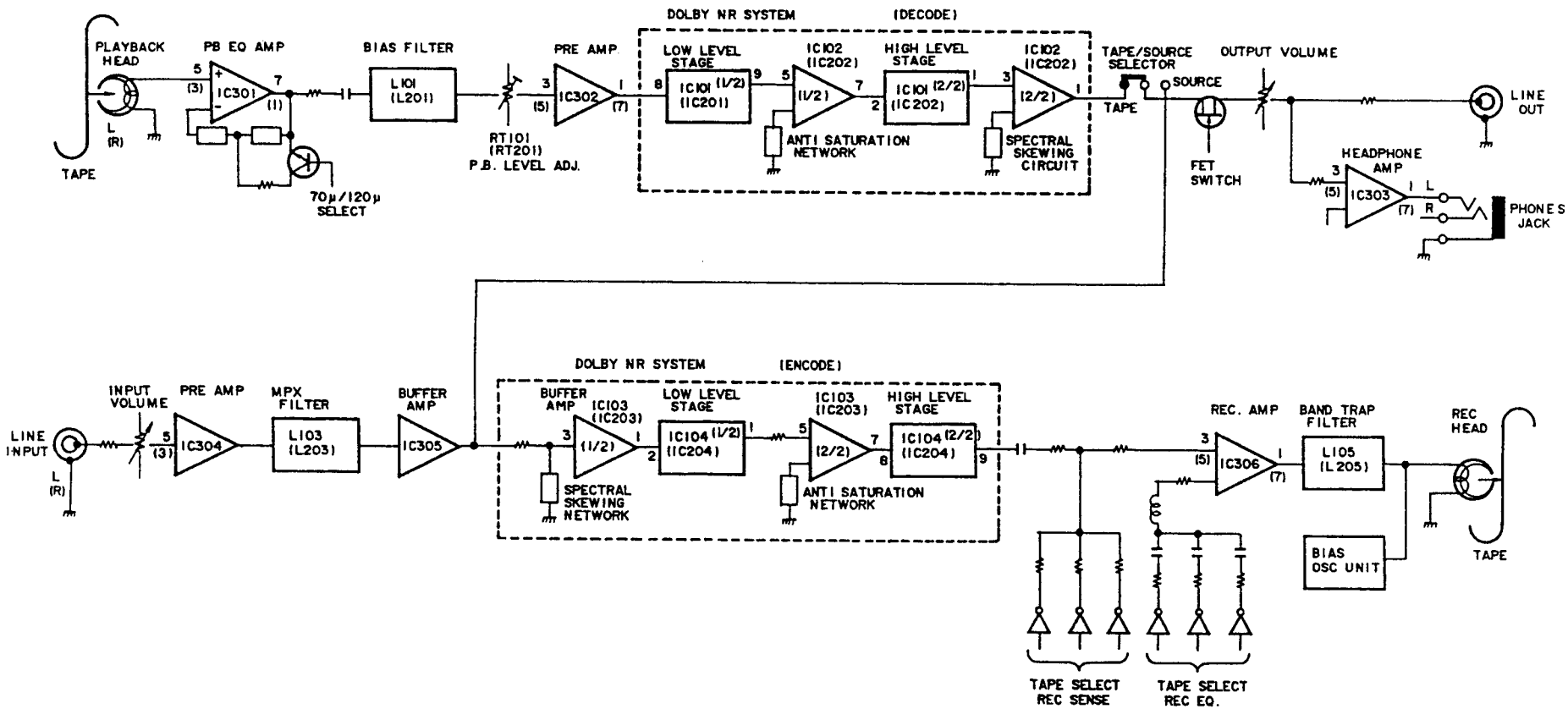
1. Component parts

Parts marked with ⚠ and/or shading in this service manual have special characteristics important to safety. Besure to use the specified parts for replacement.

2. Leakage current

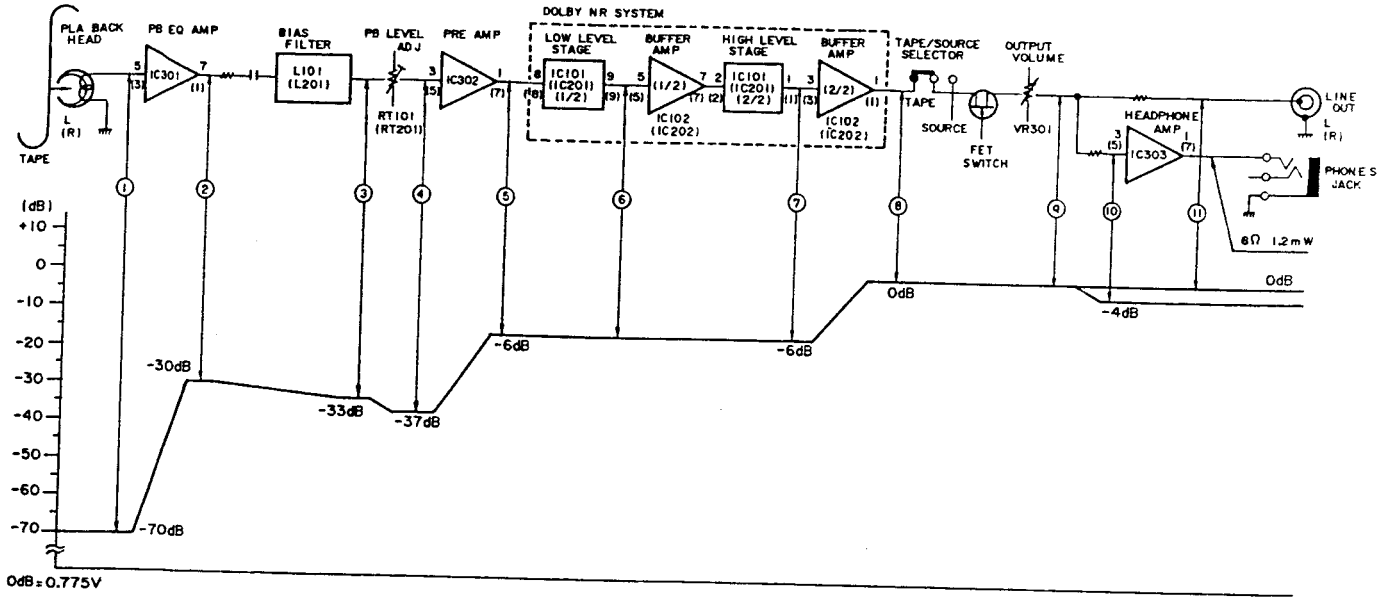
Before returning the appliance to customer, test the leakage current when the power plug is connected. Use a calibrated (with an error of not more than 5%) leakage current tester and measure the leakage current from any exposed metal to the earth ground. Reverse the power plug polarity and test the above again.

Any current measured MUST NOT EXCEED 0.5 milliamps. Corrective measure must be taken if it exceeds the limit.

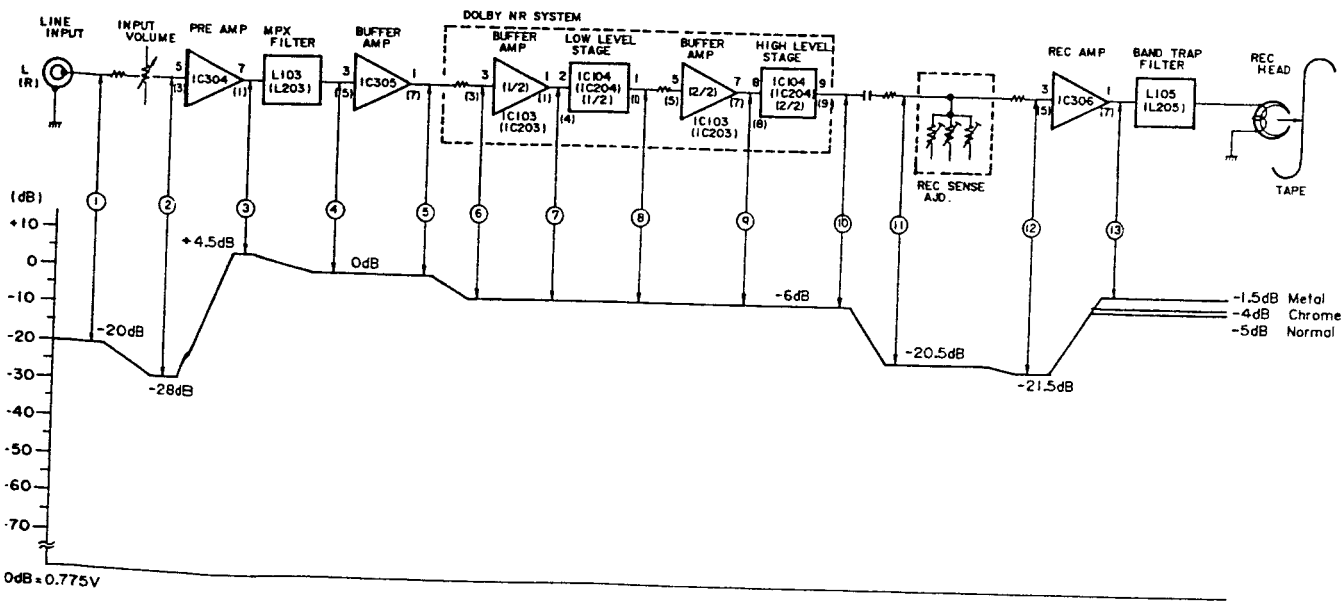

PLAYBACK HEAD
TAPE
L (R)
PB EQ AMP
IC301
70μ/120μ SELECT
BIAS FILTER
L101 (L201)
RT101 (RT201) P.B. LEVEL ADJ.
PRE AMP
IC302
DOLBY NR SYSTEM (DECODE)
LOW LEVEL STAGE
IC101 (1/2) (IC201)
IC102 (IC202)
(1/2)
ANTI SATURATION NETWORK
HIGH LEVEL STAGE
IC101 (2/2) (IC202)
IC102 (IC202)
(2/2)
SPECTRAL SKEWING CIRCUIT
TAPE/SOURCE SELECTOR
TAPE
SOURCE
FET SWITCH
OUTPUT VOLUME
LINE OUT
HEADPHONE AMP
IC303
PHONES JACK
LINE INPUT
INPUT VOLUME
PRE AMP
IC304
MPX FILTER
L103 (L203)
BUFFER AMP
IC305
DOLBY NR SYSTEM (ENCODE)
BUFFER AMP
IC103 (IC203)
(1/2)
SPECTRAL SKEWING NETWORK
LOW LEVEL STAGE
IC104 (1/2) (IC204)
IC103 (IC203)
(2/2)
ANTI SATURATION NETWORK
HIGH LEVEL STAGE
IC104 (2/2) (IC204)
REC. AMP
IC306
BAND TRAP FILTER
L105 (L205)
BIAS OSC UNIT
REC HEAD
TAPE
TAPE SELECT REC SENSE
TAPE SELECT REC EQ.

LEVEL DIAGRAM

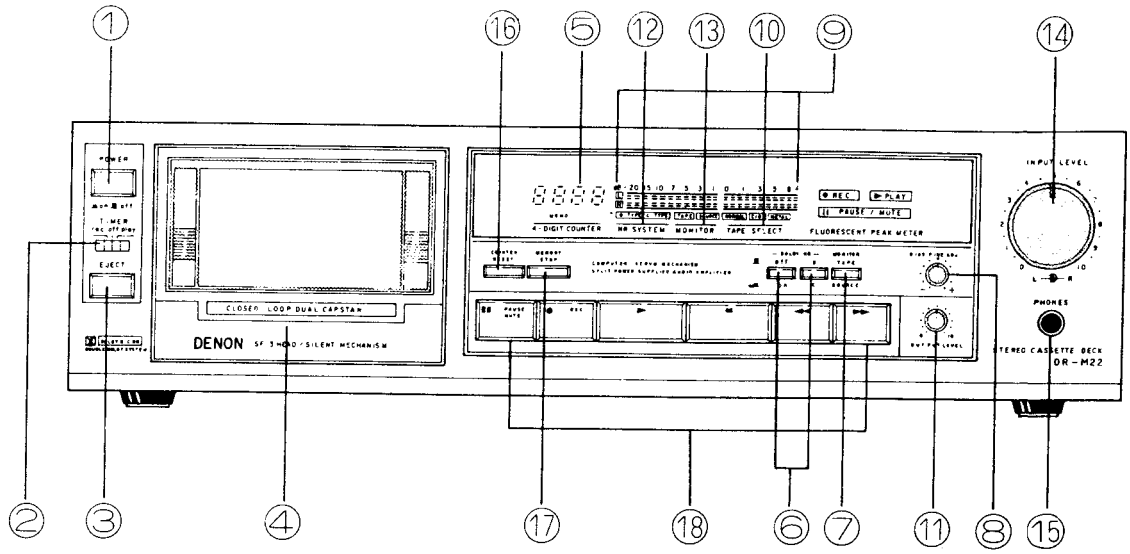
PLAYBACK SYSTEM



RECORDING SYSTEM



PART NAMES AND FUNCTIONS



1. POWER switch

Controls the supply of AC power to the deck. One push turns the deck on, a second push turns it off. The deck remains in a stand-by (non-operative) mode for approximately 4 seconds after it is switched on.

2. TIMER switch

This switch is provided for use with an optional audio timer for unattended recording or morning-alarm playback. For non-timer operation, this switch should be set in the "off" position.

3. EJECT button

Press this button to eject the cassette. When the deck is operating (tape is running), press the stop (■) key first to stop the tape transport; then press the EJECT button.

4. Cassette compartment cover

If this compartment cover is not closed completely, the deck's transport controls will remain inoperative.

5. TAPE COUNTER

A four-digit readout indicates the present tape count position.

6. DOLBY NR switches

The left Dolby NR switch activates (in) or deactivates (
the deck's Dolby noise reduction circuitry. The r
switch selects between Dolby B-Type (out) or C-T
NR (in).

7. MONITOR switch

The SOURCE (in) position of this switch allows yo
monitor the source program before it is recorded.
TAPE (out) position of this switch is used for tape p
back monitoring or simultaneous monitoring during rec
ing.

8. BIAS FINE ADJ control

(for NORMAL and CrO_2 tape)

Adjust the bias according to the tape characteris
Standard biasing is obtained at the center click-stop p
tion.

9. FLUORESCENT PEAK METERS

These meters indicate recording or playback peak le
for each channel.

10. TAPE SELECT indicator

This indicator light is interlocked with the Auto Tape Select feature which automatically adjusts the deck to the type of tape in use. (NORMAL, CrO_2, or METAL).

11. OUTPUT LEVEL control

This control adjusts playback, recording monitor, and headphones output levels for the both channels simultaneously.

12. NR SYSTEM indicator

This indicator light is interlocked with the Dolby NR switch and informs the user that Dolby NR is in use as well as which (B or C) Type.

13. MONITOR indicator

This indicator light is interlocked with the MONITOR switch to inform the use of the selected monitoring source —TAPE or SOURCE.

14. INPUT LEVEL controls

These controls are used to adjust recording levels for each channel. The front control is for the left channel; the rear control for the right channel.

15. PHONES jack

For private music enjoyment without disturbing others, or for monitoring a recording, a set of headphones may be plugged in. Impedance is from 8 to 1200 ohms.

16. COUNTER RESET button

Operation of the button resets the counter to all zero.

17. MEMORY STOP button

During rewinding operations, the tape will stop at the "0000" counter point automatically when this button is pressed in.

18. Tape transport controls

▶	▶ PLAY KEY	Press to playback tape.
■	■ STOP KEY	Press to stop tape in any mode.
◀◀	◀◀ REW KEY	Press for fast rewind.
▶▶	▶▶ FF KEY	Press for fast forward tape winding.
● REC	● RECORD KEY	To begin recording, press the RECORD and PLAY keys simultaneously. If only the RECORD key is pressed, the deck is placed in the REC PAUSE (record standby) mode.
▮▮ PAUSE MUTE	▮▮ PAUSE/MUTE KEY	The PAUSE key causes the tape to stop momentarily during recording or to mute the recording input to create blank (non-recorded) portions on the tape.

• Outline of the Mechanism Control Microcomputer

The function of the microcomputer, which is applied to the uni-directional transport cam drive control cassette deck mechanism, will receive an outside signal from the operation switch (operations such as PLAY, REC, STOP, FF) during the recognition of the current condition or from the surrounding circuits of the microcomputer (counter, cam encoder, reel pulse, etc.) and sends the appropriate control signal.

To the mechanism: rotational direction of the reel motor, speed, stop, rotational direction of the cam motor, stop.

To the counter: makes an output of the mechanism run mode command (REW, FF, PAUSE, PLAY).

To the display: REC, PAUSE (REC MUTE during flash).

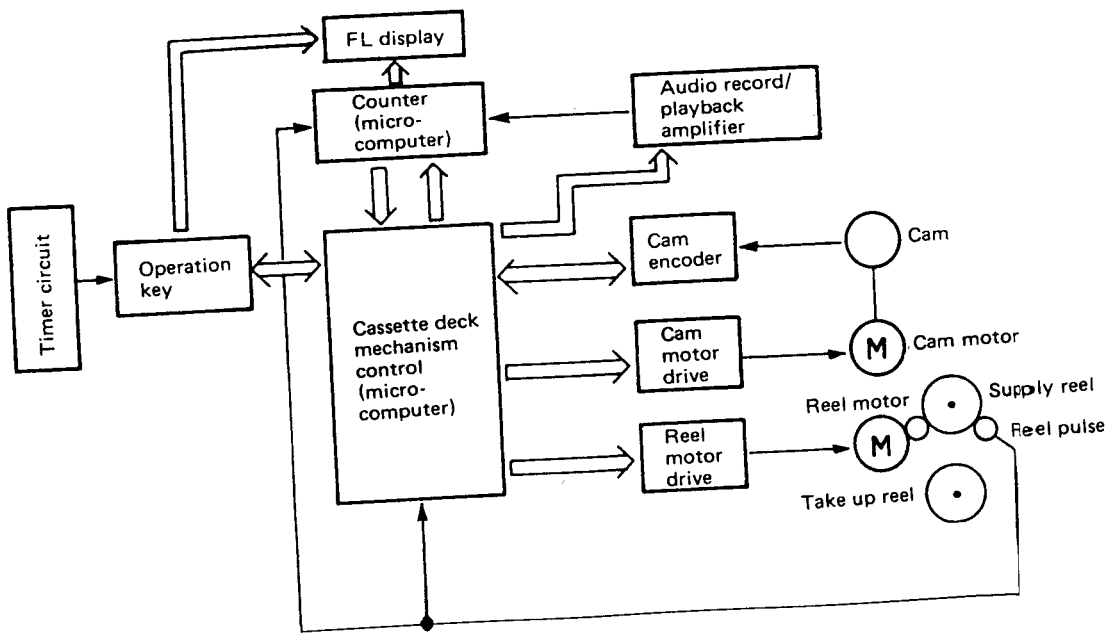
In addition, the following points are taken into consideration.

(1) Stable and accurate cam rotation position control is required since a cam drive method is employed to make the mechanism silent. Accurate rotation position control is performed by using a cam drive with a rotary encoder detected digital feedback servo.

(2) Since the leading time of the cam drive is slower when compared to that of the plunger method, problems will arise when attempting record/playback or stop at the designated tape position from FF or REW, since tape overrun occurs.

(3) Overload measures of the cam

If the cam stops due to an overload for any reason and cannot shift to the target position within 4 seconds, it is immediately shifted to STOP. If this cannot be shifted within 4 seconds, the microcomputer will stop all controls and stop the motor to prevent a breakdown.



DISASSEMBLY INSTRUCTIONS

1. How to Remove the Front Panel

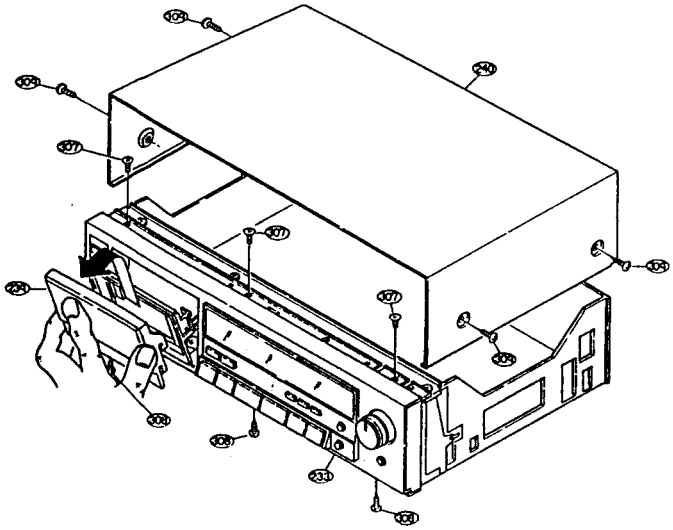
(1) Unscrew the 4 screws 309 from both sides of the top cover 240 and take off the top cover by pulling it up.

(2) Press the eject knob 231, open the cassette window 239 and take off the mechanism, as shown in the diagram.

Note: Be careful when handling the cassette window, as it is easily scratched.)

(3) Remove the connector (3P) with lead wires, which runs from the timer switch 234 to the rear of the logic circuit board 202, from the logic circuit board.

(4) The front panel can be removed by unscrewing the upper screws (3x8 CFTS S tight) 307 from the front panel 233 and the 3 lower screws (3x8 CBTS P tight) 308.



2. How to Remove the Mechanisms

(1) Remove the top cover 240 and the front panel 233. (Refer to section 1)

(2) Unscrew the 2 mechanism holding screws (3x6 CBTS S tight) 304 from the bottom surface of the chassis 201.

(3) Unscrew the 2 screws (3x6 CBTS S tight) 304 holding the angle 210 and the mechanism 207 and the 3 chassis holding screws 301, 310 and remove the angle.

(4) Remove the connectors with lead wires, which runs from the mechanism section, from the circuit board.

Audio circuit board side 3P connector CN302 CN304
4P connector CN305, CN306

Logic circuit board side 2P connector CN2 CN4
5P connector CN8 CN9
6P connector CN10

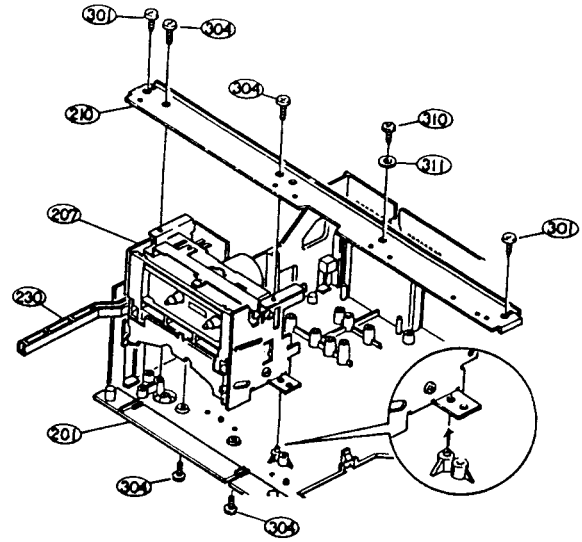
Note: When assembling, check to make sure the connectors are inserted correctly.

(5) Pull out the power switch lever 230 from the power switch 259.

(6) Remove the eject knob 231.

(7) The mechanism can be removed by holding the mechanism and pulling up.

Note: When assembling, do so after checking to make sure the 2 stay holes on the lower side of the mechanism unit are matched with the chassis protrusions.



3. Removal of Front Escutchion, Meter Window, and Control Button

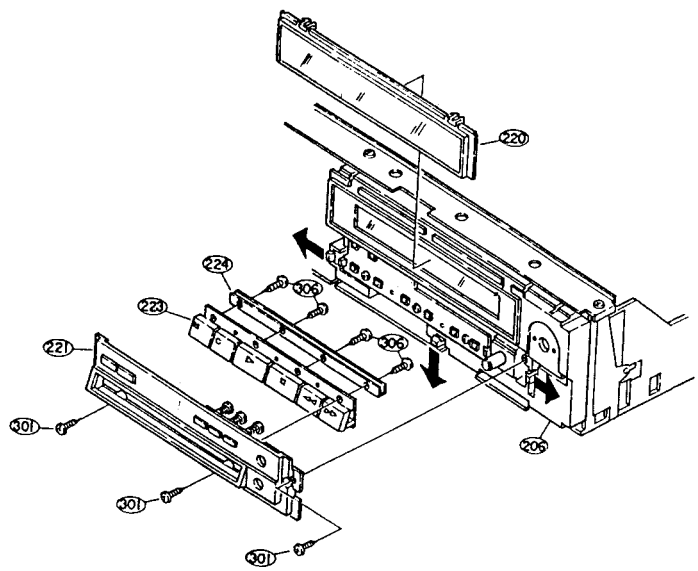
(1) Remove Top Cover (240) and Front Panel (233). (Refer to Section 1)

(2) Unscrew the 3 screws (3 x 8 CBTS P Tight) (301) which secure Front Escutchion.

(3) Front Escutchion (221) is fixed to the Front Chassis (206) by 3 pins; located at right, left, and below, so that Front Escutchion may be removed when these pins are removed in order of right, below and left as indicated by arrow.

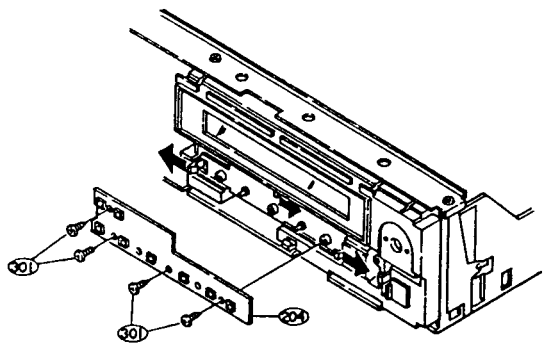
(4) Meter Window (220) may be removed after Front Escuthion 221 is removed.

(5) Control Button (223) should be removed after the 4 screws (306) (2.6 x 8 CBTS P Tight) are removed which secure the Press Bar (224).

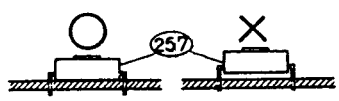


4. How to Remove the Control Circuit Board

(1) Remove the top cover 240 and the front panel 233. (Refer to Section 1)
(2) Remove the front escuchion 221. (Refer to section 3)
(3) Remove the connectors with lead wires which run from the control circuit board 204.
FL counter circuit board side 5P connector CN406
Logic circuit board side 8P connector CN5
(4) By unscrewing 3 screw (3x8 CBTS P tight) 301 holding the control circuit board and loosening the 3 hooks on the control circuit board 204 can be removed.



Note: When replacing the tact switch 257, always check to make sure that it is not floating above the circuit board. If it is floating, the switch will be in the on condition when the set is assembled.



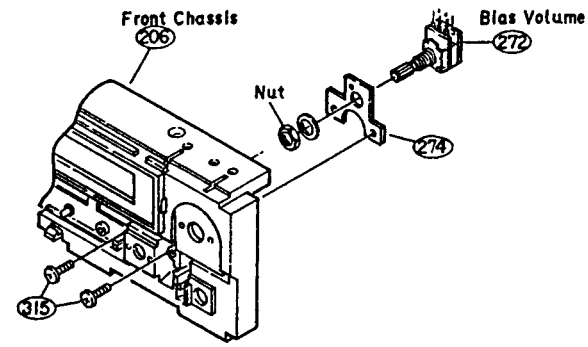
5. How to Remove the FL Meter

(1) Remove the top cover 240 (Refer to section 1)
(2) Remove the connectors on the FL meter circuit board 205.
(3) Remove the 2 screws (307) (3 x 8 CFTS S Tight) which secure FL Meter, Screw (310) (3 x 10 CBS), and washer (3W). Then the FL Meter may be removed.

CAUTION:
During assembly, avoid snagging the Shield Sheet (243), which is located under the Counter/Meter Circuit board (205), on the FL Meter.

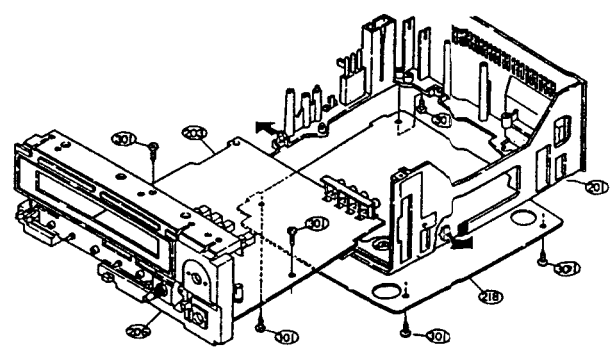
6. How to Remove the Bias Volume

(1) Remove the top cover 240 and the front panel 233. (Refer to section 1)
(2) Remove the angle 210 (Refer to section 2)
(3) Remove the front escuchion 221 and the meter window 220. (Refer to section 3)
(4) Remove the control circuit board 204, and the FL meter 256. (Refer to sections 4, 5)
(5) Unscrew the 2 screws (3 x 10 CBS) 315 holding the Bias Volume plate 274.
(6) Unscrew nat nat holding the Bias Volume.



7. How to Remove the Audio Circuit Board

(1) Remove the top cover 240 and the front panel 233. (Refer to section 1)
(2) Remove the angle 210 (Refer to section 2)
(3) Remove the front escuchion 221 and the meter window 220. (Refer to section 3)
(4) Remove the control circuit board 204, and the FL meter 256. (Refer to sections 4, 5)
(5) Remove the connectors from the audio circuit board 203.
(6) Unscrew the 4 bottom cover holding screws (3x8 CBTS P tight) 301 on the back side of the chassis 201 and remove the bottom cover 218.
(7) Unscrew the screw 301 holding the Audio amp circuit board.
(8) By lifting the front chassis 206 and loosening the 2 hooks on the chassis holding the audio circuit board 203, the audio circuit board can be removed.



When Separating the Audio Circuit Board by Itself

(9) Unscrew the nut holding the input volume 253 and remove the input volume and the shield bracket 209 toward the rear.

(10) Unscrew the 2 screws (3 x 10 CBS) 315 holding the Bias Volume plate 274 and remove the Bias Volume plate toward the rear.

(11) Unscrew the nut holding the output volume 254.

(12) Remove the spring plate holding the headphone jack 255.

(13) By removing front chassis 206, the audio circuit board can be removed by itself.

Note: Most repairs to the audio circuit board can be performed by removing the bottom cover on the chassis. Refer to the above procedure only when necessary.

When reassembling, follow the procedures in reverse order; however, if each of the various parts are not assembled properly in their respective position, the set cannot be assembled. When assembling, check the work of each step carefully.

8. How to Remove the Logic Circuit Board

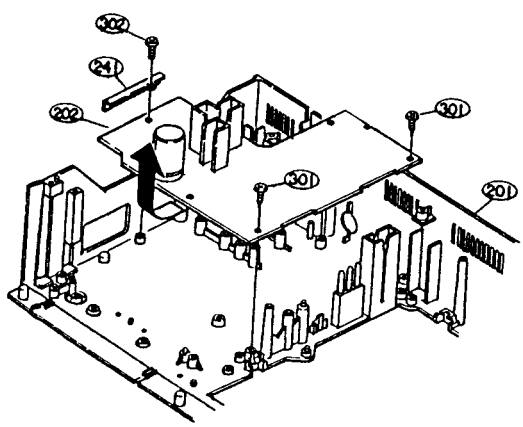
(1) Remove the top cover 240. (Refer to section 1)

(2) Remove the various connectors from the logic circuit board 202.

(3) Unscrew the screws (3x8 CBTS P tight) 301 holding the logic circuit board.

(4) Unscrew the screw (3x10 CBTS P tight) 302 holding the P.W.B support 241.

(5) Pull the logic circuit board 202 forward until the logic P.W. board is disconnected from the rear of the chassis 201; it can then be removed.



9. How to Remove the Power Supply Circuit Board

(1) Remove the top cover 240. (Refer to section 1)

(2) Unscrew the 1 screw (3x8 CBTS P tight) 301 holding the bracket 216 of the power supply circuit board 215.

(3) By pulling the power switch lever 230 out of the power supply switch, the power supply circuit board can be removed upwards.

ADJUSTING AND CHECKING THE MECHANISM SECTION

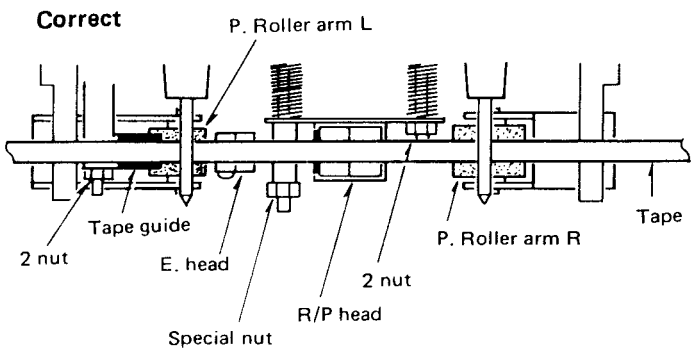
1. Replacing the Pinch Roller 23 and 104

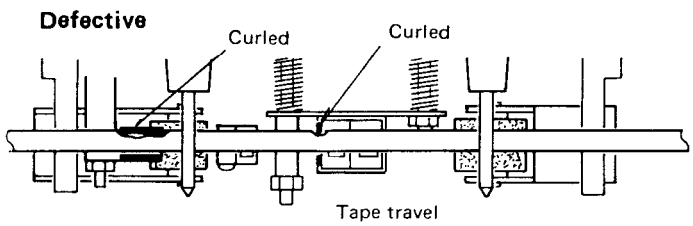
Before replacing the pinch roller, clean the tape contact surface of the pinch roller and the capstan shaft.

Most causes of poor tape transport can be traced to dirty pinch rollers and capstan shafts.

The right side pinch roller 23 can be taken out by removing spring 24 and slit washer 317. In the same manner, the left side pinch roller 104 can be taken out by removing spring 106 and slit washer 317. After replacing, play a padless C-90 tape and check for tape curls at the head tape guide section.

In addition, in the playback mode, check to make sure that the right side pinch roller contacts the capstan shaft before the left side pinch roller contacting.

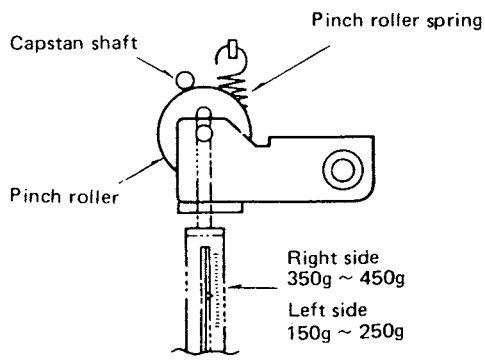




2. Checking the Pressure Force of the Pinch Roller

In the playback mode, hook a spring weight onto the bracket at the center of the pinch roller. After separating the pinch roller from the capstan shaft, allow the pinch roller to contact the capstan shaft again. When the pinch roller starts to rotate, check to make sure the rod type spring weight reading is 350g–450g for the right side and 150g ~ 250g for the left side.

If it is not within the normal range, replace the pinch roller spring 24 or 106.



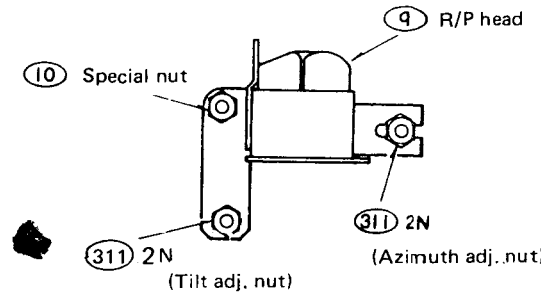
3. Replacing the Record/Playback Head

* Before replacing, remove the front panel 233.

(1) How to remove the R/P HEAD.

1) Next, Take out the azimuth adjustment NUT 311, tilt adjustment NUT 311, and the height adjustment ORDER SCREW 10 loosening them alternately.
If they are not loosened alternately, the R/P HEAD base may become warped.

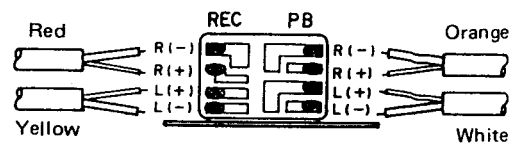
2) By unsoldering the HEAD WIRES on the circuit board section of the R/P HEAD, the entire R/P HEAD can be taken off the mechanism unit.



(2) How to assemble the R/P HEAD.

Reverse the above (1) procedures for removing the R/P HEAD.

* Solder the HEAD WIRES according to the diagram above.



4. Adjusting the R/P HEAD

(1) Height adjustments (Use the head adjusting jig M-300)

1) Set the M-300 tool plate on the mechanism unit; turn the height adjustment ORDER SCREW 10 and adjust so that the 3.8 mm measure section of the M-300 (tool grip) can pass without contacting the tape guide of the R/P HEAD 9.

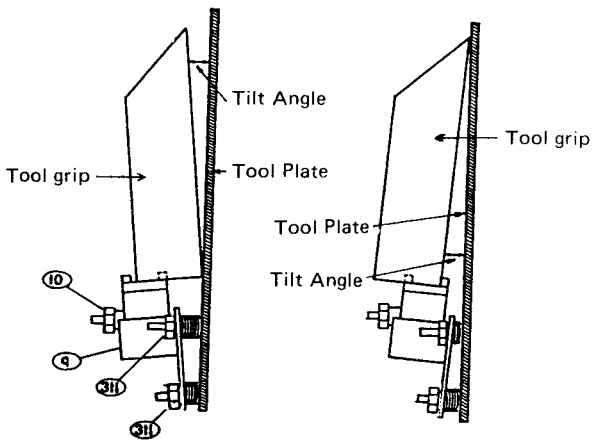
2) When adjusting the height, make sure the R/P HEAD is not tilted by turning the azimuth adjustment nut 311 nut, and checking with your eyes.

* Never allow the M-300 (tool grip) to hit the tape contact surface of the R/P HEAD strongly. It may scratch the surface.

(2) Adjusting Tilt Angle

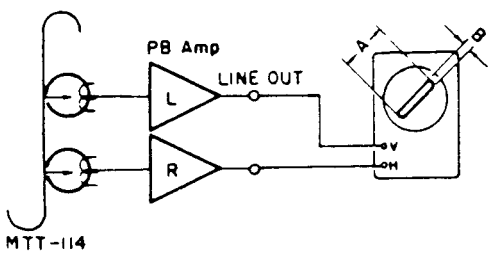
1) Set the M-300 Tool Plate on the Mechanism Unit and then place the M-300 Tool Grip on the R/P Head, and check the Tilt Angle between M-300 Tool Plate and M-300 Tool Grip. If the M-300 Tool Grip is tilting toward the front, loosen Tilt with nut (311). If the M-300 (Tool Grip) is tilting toward the rear, tighten it. Adjust the Tilt Adjustment nut (311) until the M-300 Tool Grip becomes parallel with the M-300 Tool Plate.

2) If the Tilt Angle is adjusted more than once, height Adjustment may slip. Always make sure to check height adjustment. If height has slipped, adjust it again. After adjustment, fix screw.

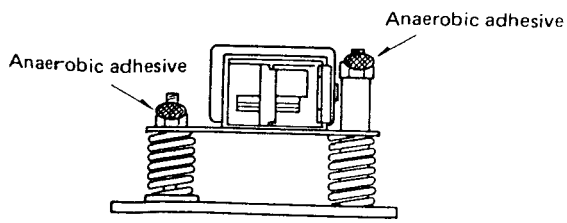


(3) Azimuth adjustments

Play back the TEAC MTT-114 test tape. Turn the azimuth adjustment nut and adjust so that A of the resurge wave form is maximum and B is minimum. After the azimuth adjustments, re-check the head height with the M-300 to make sure the height has not deviated.



* After the adjustments, apply anaerobic adhesive on the positions indicated in the diagram.



5. Adjustment and Replacement of Erasing Head (15)

(1) Height Adjustments

Set the M-300 Tool Plate on the mechanism unit. Using a surface measure of 3.8 mm from the M-300 Tool Grip, turn adjustment nut (311) and (171) and adjust the height of Erasing Head's center to coincide with the center of the M-300 Tool Grip. After adjustment, place the M-300 Tool Grip on the Erasing Head, check to see that the M-300 Tool Plate and the M-300 Tool Grip are parallel, and that the Tilt Angle has not changed. Lock after adjustment.

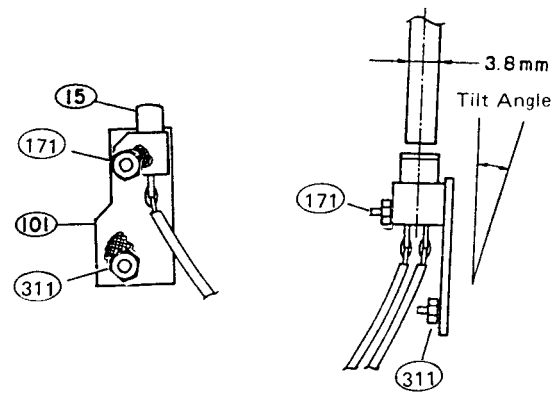
(2) Tilt Angle Adjustment

Set the M-300 Tool Plate on the mechanism unit. Place the M-300 Tool Grip on the Erasing Head, and check the gap between the M-300 Tool Plate and the Tool Grip. If the M-300 Tool Grip is tilting toward the front, loosen the Tilt adjustment nut (311). If it is tilting toward the rear, tighten it and adjust the Tilt adjustment nut (311) until the M-300 Tool Grip becomes parallel with the M-300 Tool Plate.

CAUTION: After adjusting the Tilt Angle, height adjustment may sometimes be warped. Recheck height adjustment. If it is warped, readjust the height. After adjusting, fix nuts (311) and (171).

(3) Erasing Head Replacement

Erase Head may be replaced after removing nuts (311) and (171) which affix it to the deck mechanism. After replacement, adjust the height and the Tilt angle.



6. Height Adjustment of the Tape Guide 103

Set the M-300 jig plate onto the mechanism unit and adjust the height by rotating the height adjustment nut 311 so that the 3.8mm section of the M-300 jig can pass through without contacting the tape guide section of tape guide 103.

7. Checking the Take-up Torque

Load the cassette type torque meter. Check to make sure that the torque meter average reading is within 50 ~ 90 g-cm during playback. If it is not within this range, check the voltage (3.1V ± 0.3V) of the reel motor. If the voltage is low, the torque will be weak; if it is high, the torque will be strong. In addition, check for reel thrust movement in section 8.

8. Adjusting the Reel Thrust Movement

Check to make sure that the reel thrust movement is within 0.2–0.4 mm.

9. Checking the FF and REW Torques

* When using the cassette type torque meter.
  Check to make sure the torque meter indicates more than 70 g-cm at the end of FF and REW.
* When using a modified cassette half.
  Load the modified cassette half; hook the end of the dial tension meter (full scale 100–300 g) onto the triangle section. In the FF (REW) mode, feed the tape in at a rate somewhat slower than the take up speed. Check to make sure the dial tension meter reads more than 60 g-cm.

10. Checking the Back Tension Torque During Record/Playback

Load the cassette type torque meter; check to make sure the torque meter reads between 7 ~ 13 g-cm during playback and that there is no unevenness.
If it is not within this range, check the section on adjusting the reel trust movement; or replace the spring 109.

11. Checking the FF and REW Times

Load a C-60 cassette tape; check to make sure the tape is fast forwarded or rewound within 70–110 seconds. If it is not within this range, check sections 8 and 10.

12. Checking the Operation of the Erase Prevention, Metal and Chrome Switch Operation Arms

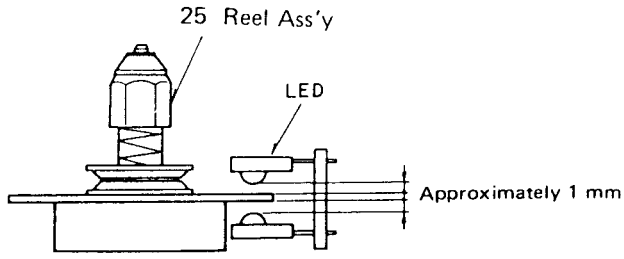
Check to make sure the operation arms 58, 59 operate the switches positively, depending on whether or not there are holes.

13. Checking the EJECT Switch 75

To check the operation of the EJECT SW with only the mechanism unit, make sure the angle 205 operates the switch positively when the hook lever 203 is operated.

14. Checking the Gap Between the Pulse Detection LED and the Reel Ass'y

Check to make sure the gap between the surface of the shutter section of the reel ass'y and the LEDs is approximately 1 mm.



ADJUSTING THE ELECTRICAL SECTIONS

• Measuring instruments necessary for adjustments

(1) Audio signal generator
(2) Variable resistance attenuator
(3) Electronic voltmeter
(4) Oscilloscope
(5) Frequency counter
(6) Adjustment screwdriver
(7) Trap coil adjustment square stick
(8) Test tapes (TEAC MTT-111, MTT-114, MTT-150)
(A-BEX TCC-262)
(DENON DX 3, DXM, DX7/50N, LX)
(9) Transport Check cassette tape
(SONY MC-112C) Mirror tape

• Cautions on adjusting

(1) Before adjusting, clean the head surface, capstan and the pinch roller with a gauze or a cotton swab moistened with alcohol.
(2) Demagnetize the R/P HEAD and the E. HEAD with a head eraser.
(3) Completely demagnetize the adjustment screwdriver
(4) Unless instructed otherwise, set the various control as follows:
– INPUT volume ..... maximun
– OUTPUT LEVEL volume ..... maximun
– DOLBY NR switch ..... OFF
– MONITOR switch ..... TAPE

1. Tape Transport Check

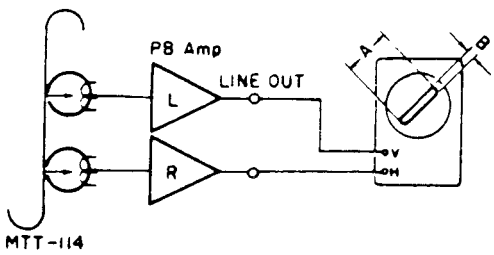
Load the transport check cassette. In the operation mode, illuminate the fixing guides of the R/P HEA with a lamp and check to make sure the tape edge do not come in contact with the tape guide section.
The tape transport is the most important element in d terming the performance of a cassette deck.
Avoid moving the various adjustment screws, nuts, etc., much as possible. The M-300 Tool Plate is a tool used pr marily for precisely adjusting the height of the tape guic attached to a tape head.
This tools is indispensable in repairing various heads, whe replacing heads, and for design purposes, in order to dete mine the location measurements for mechanical attach ments.
Even when the height of the tape guide is accurately mea ured, during actual tape play, the tape may sometime warp.
This is due to slight errors in dimensions of those part which actually come in contact with the tape, such as cas sette halves, heads, pinch-rollers, capstan shaft, etc. There fore a mirror tape is used to confirm proper running of th tape.
In this way, the M-300 Tool Plate and mirror tape are bot used to insure good tape running.

After having confirmed that the setting is correct, the mirror tape may warp anyway. In order to establish the titlt angles of the recording/plaback head and the erase head, adjust (by turning 1/4 – 1/2 turns) the level adjusting screw (311) of the tape guide (103). Refer to the pages on "Adjusting and checking the Mechanism Section" when replacing or adjusting the R/P HEAD.

2. Adjusting the Azimuth

(1) After completing the tape transport check load the test tape (TEAC MTT-114).

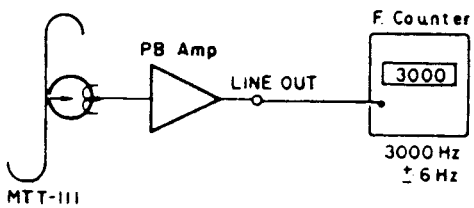
(2) Play back the test tape; adjust the azimuth nut so that section A of the resurge wave form is maximum and section B is minimum.



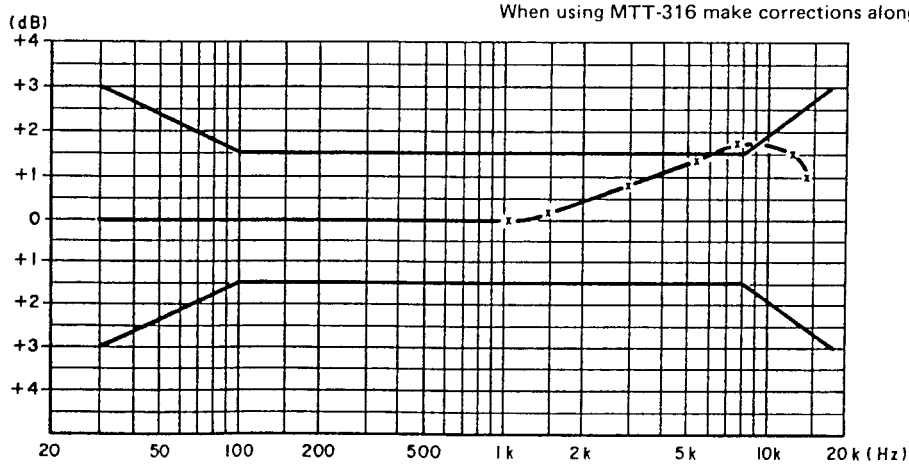
3. Checking and Adjusting the Tape Speed

1) Connect the frequency counter to the LINE OUT terminal and load the test tape (TEAC MTT-111).

2) Playback a test tape. At about halfway through the tape, where the tape transport is stable, adjust the adjustment points on the back of the capstan motor so that the frequency counter will have a reading within the the range of 3,000 Hz ± 6Hz.

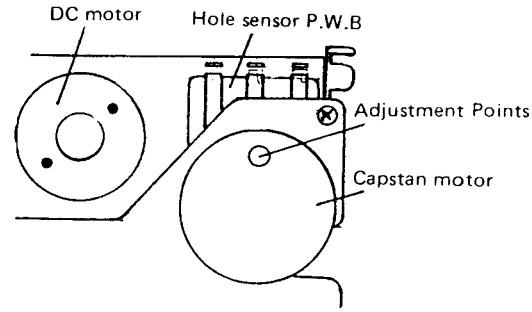


Playback Frequency Response

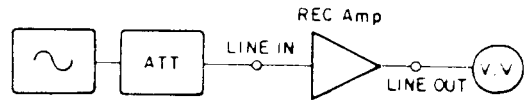


4. Adjusting the Input Sensitivity

(1) Set the MONITOR switch to SOURCE position, the operational mode at STOP. Supply a 400 Hz signal to the LINE IN terminal and set the input signal level (approx. –20 dB) so that the output level at the LINE OUT TERMINAL (L ch) becaomes 0dB.



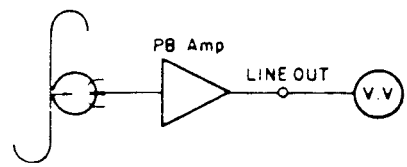
(2) At the same time, check to make sure the R ch output level is also 0dB.



5. Adjusting Playback Section

(1) Adjusting the playback level
Play back the Dolby standard level test tape (TEAC MTT-150) and adjust RT 101 (L ch), RT 201 (R ch) so that the LINE OUT voltage becomes 0 dB (0.775V).

(2) Adjusting the playback frequency response
Play back the test tape (A-BEX TCC-262) and check to make sure that the frequency response meets the specifications in the diagram.

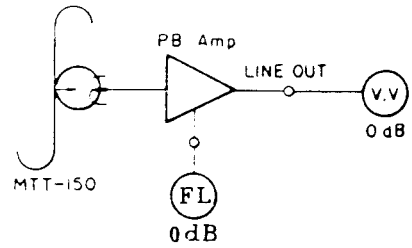


Tape : A-BEX TCC-262

When using MTT-316 make corrections along.

6. Adjusting the FL Meter

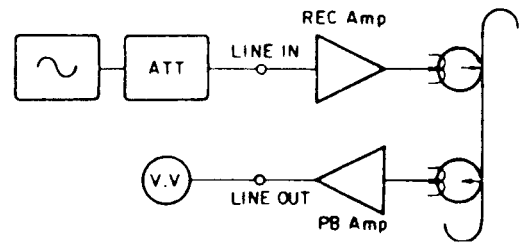
After adjusting the playback level, playback the test tape (TEAC MTT-150) and adjust RT401 (L ch), RT402 (R ch) so that the FL meter indicates 0dB when the LINE OUT terminal level is 0dB (0.775V).



7. Adjusting the Recording Section

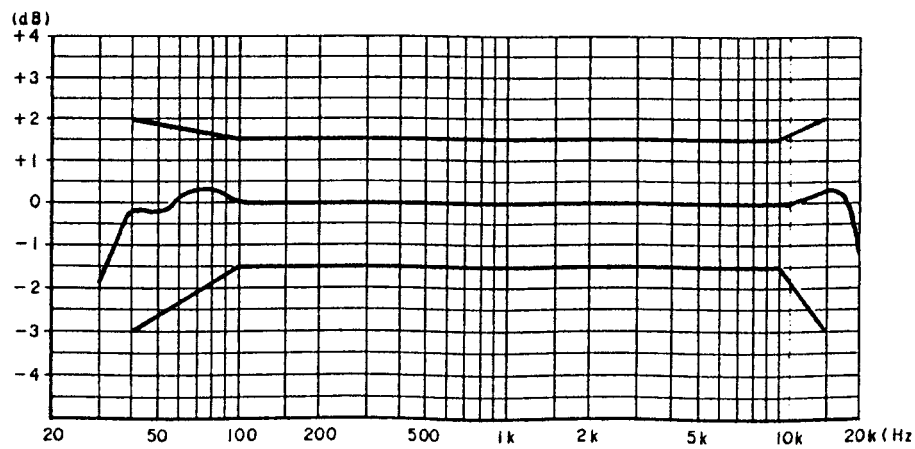
(1) Adjusting the record/playback overall frequency response.

1) Load the test tape DX7/50N; record a signal with an input level of–41 dB, 1 KHz at the LINE IN terminal; play back this recording.
2) Change the frequency of the input signal to 12kHz, record and playback; adjust RT102 (L ch), RT202 (R ch) so that the characteristic standards meet the following diagram when compared to the 1kHz signal output level.
3) Load the test tape DXM; record a signal with an input level of –41dB, 1kHz at the LINE IN terminal; Play back this recording.
4) Change the frequency of the input signal to 12kHz, record and playback; adjust RT301 so that the 12kHz signal output level gos within the limits of 0dB ± 2dB when compared to the 1kHz signal output level.
5) Load the tape DX3; record a signal with an input level of –41dB, 1kHz at the LINE IN terminal; Play back this recording.
6) Change the frequency of the input signal to 12kHz, record and playback; adjust RT302 so that the 12kHz signal output level gos within the limits of 0dB ± 2dB when compared to the 1kHz signal output level.



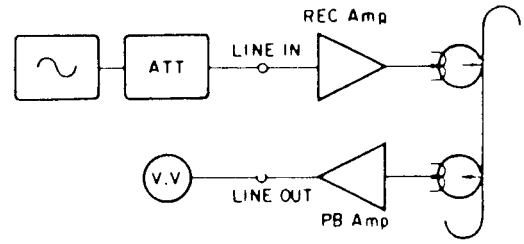
Record/Playback Overall Frequency Response

Tape: DN7N Dolby: off
Level: –20dB from Dolby.



(2) Adjusting the record/playback levels

1) Load the test tape DX7/50N and record a signal of 1kHz (–41 dB).
2) Adjust RT104 (L ch), RT204 (R ch) so that the output level is the same when the MONITOR switch is switched from SOURCE to TAPE position.
3) Load the test tape and record a signal of 1kHz (–41dB).
4) Adjust RT 103 (L ch), RT 203 (R ch) so that the output level is the same when the MONITOR switch is switched from SOURCE to TAPE position.
5) Load the test tape DX3 and record a signal of 1kHz (–41 dB).
6) Adjust RT105 (L ch), RT 205 (R ch) so that the output level is the same when the MONITOR switch is switched from SOURCE to TAPE position.

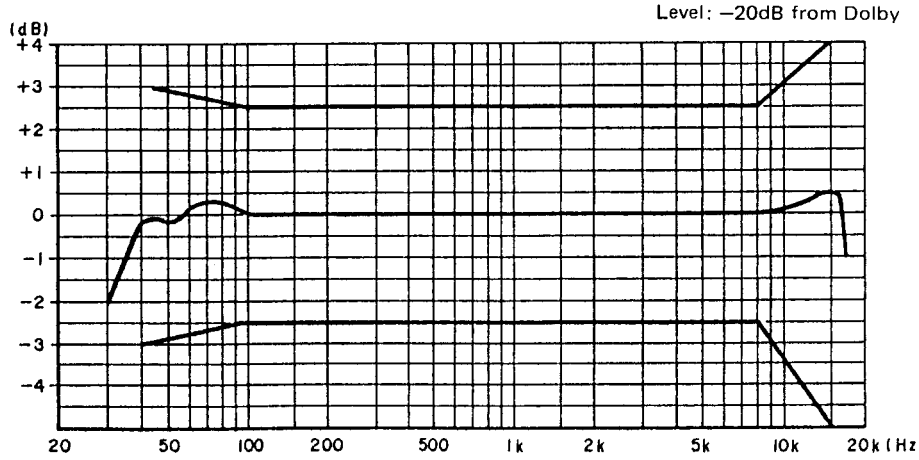


(3) Checking the Dolby C record/playback overall frequency response

1) Set the DOLBY NR switch to the "C" position.
2) Using the test tapes DXM, DX7/50N, DX-3, perform record/playback in the same manner as 7-(1).
3) Check to make sure that the record/playback overall frequency response meets the specifications in the diagram.

Dolby C Record/Playback Overall Frequency Response.

Tape: DX7N
Dolby: on, C
Level: –20dB from Dolby



- **Beat Interference**

Beat interference may result if the unit is used close to an AM tuner. In this case separate the distance between the tuner and the cassette deck.

KU-5350 AUDIO UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC101,201 104,204	2630309001	TEA0652	
IC102,202 103,203 302~306	2630189001	M5218L	
IC301	2630226003	M5220L	
IC307,308	2620290007	HD74LS05P	
TR302	2710113010	2SA999(F)	
TR304	2730195005	2SC2060(Q)	
TR106 111,213	2730204035	2SC2320(F/E)	
TR101~105 107,110 112~115 201~207 210~212 214,215 301,303 305~308	2730245007	2SC2603(E/F)	
TR108,109 208,209	2750043014	2SK381(C/D)	
D301~310	2760049008	1S2076	
RESISTOR GROUP			
R341	2412333062	RD14B==102J	1KΩ
R307	2412333088	RD148==122J	1.2KΩ
R310	2412335002	RD14B==392J	3.9KΩ
⚠R333	2442036012	RD14B2H3R9JFR	3.9Ω 1/2W
			Variable resistor
VR301	2118076005	V1620V--103KA	10KΩA
VR302	2118075006	V1611V--503KA	50KΩA
VR303	2118077004	V1220V30KB501	500ΩB
RT301	2116000015	V08PB103	10KΩB
RT302	2116039002	V08PB201	200ΩB
RT101,201	2116000073	V08PB203	20KΩB
RT102,202	2116000086	V08PB204	200KΩB
RT103,203	2116000073	V08PB203	20KΩB
RT104,204 105,205	2116000015	V08PB103	10KΩB
CAPACITOR GROUP			
			Ceramic
C103,203	2533627000	CC45SL1H101J	100PF 50V
C124,224	2533633007	CC45SL1H181J	180PF 50V
C101,201	2533635005	CC45SL1H221J	220PF 50V
C144,244	2531055056	CK45B1H221K	220PF 50V
C128,228	2531003008	CK45B1H681K	680PF 50V
C156,256	2531006005	CK45B1H222K	0.0022μF 50V
C149,249	2531062007	CK45B1H392K	0.0039μF 50V
C151,251	2531063006	CK45B1H562K	0.056μF 50V
C314	2531009002	CK45B1H682K	0.068μF 50V
C304,305	2531024003	CK45F1H103Z	0.01μF 50V

Ref. No.	Part No.	Part Name	Remarks
C317			
C121,221 136,236	2539014002	CK45=1E683M	0.068μF 15V
			Electrolytic
C107,207 311	2544146004	CED4W1H010=	1μF 50V
C127,227 147,247 123,223 125,225 312	2544140000	CE04W1V4R7=	4.7μF 35V
C106,206 108,208 116,216 126,226 131,231 139,239 155,255 157,257 303,307 308,309	2544132005	CE04W1C100=	10μF 16V
C301,302	2541025002	CE04W1A470=	47μF 10V
C109,209 118,218 133,233 140,240	2549014005	CE04W1H0RIM	0.1μF 50V
C117,217 132,232	2549014034	CE04W1HR15M	0.15μF 50V
C310	2544131006	CE04W1A221=	220μF 10V
C316	2544132005	CE04W1C100=	10μF 16V
			Film
C150,250	2551120026	CQ93M1H152J	0.0015μF 50V
C145,245	2551120039	CQ93M1H182J	0.0018μF 50V
C152,252	2551120055	CQ93M1H272J	0.0027μF 50V
C153,253	2551120068	CQ93M1H332J	0.0033μF 50V
C113,213 115,215 130,230 138,238 148,248	2551120084	CQ93M1H472J	0.0047μF 50V
C104,204	2551120097	CQ93M1H562J	0.0056μF 50V
C105,205	2551121009	CQ93M1H682J	0.0068μF 50V
C112,212 137,237	2551121025	CQ93M1H103J	0.01μF 50V
C313	2551074004	CQ93M1H153K	0.015μF 50V
C114,214 129,229	2551121083	CQ93M1H333J	0.003μF 50V
C110,210 119,219 134,234 141,241	2551078000	CQ93M1H333K	0.033μF 50V

Ref. No.	Part No.	Part Name	Remarks
C146,246	2551121096	CQ93M1H393J	0.039μF 50V
C120,220	2551122008	CQ93M1H473J	0.047μF 50V
135,235			
C315	2554078081	CQ93P2A562J	0.0056μF 100V
C111,211	2561030025	CF93B2A224J	0.22μF 100V
142,242			
OTHER PARTS GROUP			
L101,201	2310825009	BIAS FILTER	
L102,202	2538011008	INDUCTOR	
104,204			
L103,203	2328043006	MPX FILTER	
L106,206	2358005001	INDUCTOR	
L105,205	2328044005	BAND TRAP FILTER	
L301	2358005030	INDUCTOR	
T301	2398022002	OSC COIL	
S301	2129232003	PUSH SWITCH	
S302	2129224008	PUCH SWITCH	
J301	2048114008	4P PIN JACK	
J302	2048109013	HEADPHONE JACK	
CN301	2035622079	MINI CONNE PIN	
CN302	2035622008	3PMINI CONNE PIN	
CN303	2042095013	10P EI CON WIRE	
CN304	2035622008	3P MINI CONNE PIN	
CN305	2035622024	4P MINI CONNE PIN	
306			
CN307	2050185038	3P WIRE HOLDER	
~314			

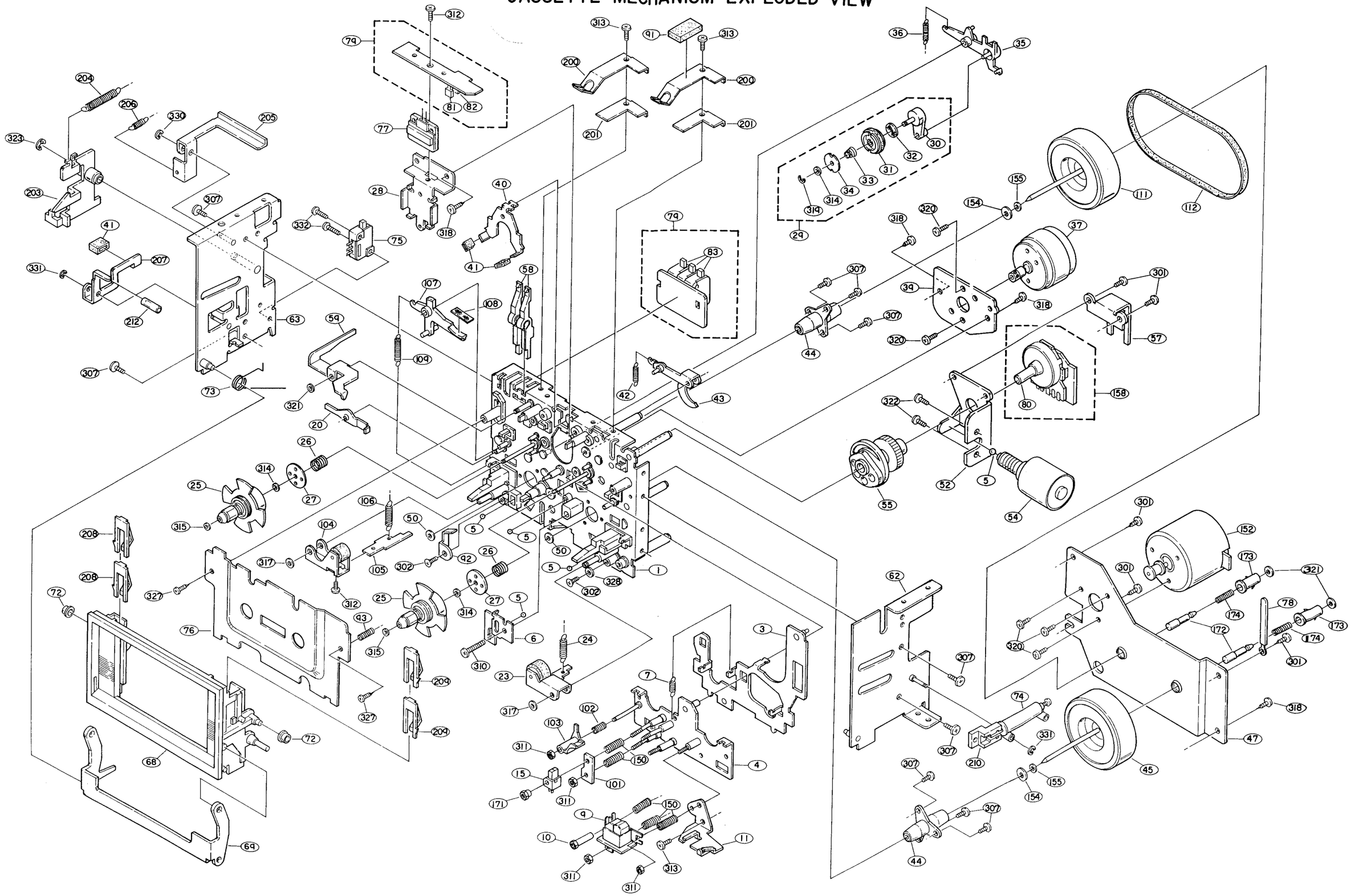
PARTS LIST OF MECHANISM 85 UNIT

Ref. No.	Part No.	Part Name	Remarks
1	4118339300	MECHA BASE ASS'Y	
3	4318076308	HEAD SLIDER ASS'Y	
4	4318106003	HEAD PLATE ASS'Y	
5	4258011009	STEEL BALL ASS'Y	
6	4318080200	BALL GUIDE PLATE	
7	4638230002	SPRING	
9	3918076107	R/P HEAD	
10	4438671104	SPECIAL NUT	
11	4418994102	CORD HOLDER	
15	3918826001	ERASE HEAD	
20	4338224208	STOPPER	
23	4338194105	P ROLLER ARM	
24	4638231108	SPRING	
25	4218400003	REEL ASS'Y	
26	4638261000	SPRING	
27	4338199003	FRICTION PLATE	
28	4418961300	LAMP HOLDER	
29	4338238414	I. ARM (B) G	
30	4338239109	IDLER ARM (B)	
31	4218324312	IDLER ASS'Y	
32	4618126107	FRICTION FELT	
33	4638625206	SPRING	
34	4428029106	THROST WASHER	
35	4338236209	IDLER ARM (A)	
36	4638271003	SPRING	
37	2178098007	DC MOTOR ASS'Y	
39	4418962309	DC MOTOR FIX PLATE	
40	4318081403	BRAKE	
41	4618127106	BRAKE SHOE	
42	4638234105	SPRING	
43	4338232203	BRAKE ARM ASS'Y	
44	4438648302	METAL HOUSING ASS'Y	
45	4218381203	C.WHEEL (S) ASS'Y	
47	4128784314	BACK PLATE	
50	4770090074	WASHER	
52	4418966208	CAM MOTOR HOLDER	
54	2178080303	CAM MOTOR ASS'Y	
55	4248027304	CAM	
57	4428018104	ENCODER BRACKET	
58	4338225304	HOLE SENSOR (1)	
59	4338226400	HOLE SENSOR (2)	
62	4428147305	RIGHT STAY ASS'Y	
63	4428145200	LEFT STAY ASS'Y	
68	1038242305	C. BOX (A)	
69	4338270304	CASSETTE BOX (B)	
72	4318097002	COLLAR	
73	4638236116	BOX SPRING	
74	4698013104	AIR DUMPPER	
75	2129200006	SLIDE SWITCH	
76	1448508202	ESC PLATE	
77	3939179009	LN0105 GP3	
78	4458028009	CORD HOLDER	
79	KU-5100	E HOLE SENS PWB	
80	2123331201	ROTARY ENCODER	
81	3939178000	LN25RCP	
82	3939026000	PN150	

Ref. No.	Part No.	Part Name	Remarks
83	2129201005	SLIDE SWITCH	
91	1290024073	SOFT TAPE	
92	4428165002	SLIDER SPACER	
93	4638842005	SPRING	
101	4428167000	E HEAD BASE	
102	4638621103	SPRING	
103	4338193009	TAPE GUIDE	
104	4338196103	P-ROLLER ARM-L	
105	4338198101	P. ROLLER ARM PLATE	
106	4638260001	SPRING	
107	4338201205	BACK TENSION ARM	
108	4618125108	FRICTION FELT	
109	4638234105	SPRING	
111	4218381229	C WHEEL (S) ASS'Y	
112	4238028119	BELT	
150	4638819012	SPRING	
152	2178083106	C P MOTOR SUB	
154	4258058004	WASHER	
155	4770090016	WASHER	
158	KU-51002	ENCODER PWB	
171	4438818006	SPECIAL NUT	
172	4228175001	CAPSTAN JOURNAL (1)	
173	4228176107	CAPSTAN JOURNAL (2)	
174	4638640003	SPRING	
200	4638829303	CASSETTE SPRING	
201	4428154107	C P SUPPORT	
203	4338269409	HOOK	
204	4638256002	SPRING	
205	4128829004	ANGLE	
206	4638257001	SPRING	
207	4318103006	SW LEVER	
208	1038243304	CASSETTE SUPPORT (L)	
209	1038243317	CASSETTE SUPPORT (R)	
210	4338271109	DAMPER GUIDE	
212	1250021003	VINYL TUBE	
301	4377002005	3x6 CBTS (S)	
302	4737500028	3x8 CFTS (P)	
307	4713202010	2.6 x 5 CBS	
310	4713802025	2.6 x 14 CBS	
311	4756020000	2N	
312	4713102013	2x5 CBS	
313	4713201011	2.6x4 CBS	
314	4770090003	WASHER	
315	4751119107	SLIP WASHER	
317	4751121108	SLIP WASHER	
318	4737500002	3x6 CBTS (P)	
319	4761000002	1.5 E RING	
320	4713802012	2.6 x 3 CBS	
321	4751120109	SLIT WASHER	
322	4713801039	2x3 CBS	
323	4761003009	3E RING	
327	4730154028	2x8 CRTS	
328	4751005004	4W	
330	4761002000	2.5 E RING	
331	4761001001	2 E RING	
332	4713204018	2.6x8 CBS	

EXPLODED VIEW OF MECHANISM 85 UNIT

CASSETTE MECHANISM EXPLODED VIEW



KU-5371 COUNTER/METER UNIT

Ref No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC401	2620440006	BA6146	
402			
IC403	2620439004	μPD554C-121	
TR401	2730245007	2SC2603 (E/F)	
~404			
D401	2760049008	1S2076	
405			
RESISTOR GROUP			
RB401	2462013002	RK99=2B473MP5	47KΩx5 1/8W
RB402	2462010092	RK99=2B104MP4	100KΩx4 1/8W
RB403	2462012032	RK99=2B104MP8	100KΩx8 1/8W
RT401	2116000044	V08PB503	50KΩ B 1/8W
402			
CAPACITOR GROUP			
C407	2531006005	CK45B1H222K	0.0022μF 50V
408			
C409	2531025002	CK45F1H223Z	0.022μF 50V
C402	2544133004	CE04W1C220=	22μF 16V
405			
C406	2544132005	CE04W1C100=	10μF 16V
C404	2544140000	CE04W1V4R7=	4.7μF 35V
C401	2544147003	CE04W1H2R2=	2.2μF 50V
403			
OTHER PARTS GROUP			
L401	2358014034	INDUCTOR 220μH	
CN407	2035622040	10P MINI CONNE PIN	
CN402	2035622066	5P MINI CONNE PIN	
406			
CN405	2032075001	2P CONNECTOR BASE	
*	3934010008	FL METER	
	4428211202	METER HOLDER	

• The carbon resistors rated at ¼W are not listed herein.

KU5381 CONTROL UNIT

Ref No.	Part No.	Part Name	Remarks
S451	2124388004	TACT SWITCH	
~458			
CN451	2045413003	8P EI CON WITH WIRE	
CN452	2038136009	5P EI CON WITH WIRE	

KU-5100 MECHANISM P.W.B UNIT

Ref. No.	Part No.	Part Name	Remarks
OTHER PARTS GROUP			
	2031638054	2P E1 CON WITH WIRE	
	2035691000	3P E1 CON WITH WIRE	
	2050185067	6P WIRE HOLDER	
	2129201005	SLIDE SWITCH	
LE4.5	3939178000	LN25RCP	
PTR	3939026000	PN150	
	2041630026	5P EI CON WITH WIRE	
	2123331201	ROTARY ENCORDER	

• The carbon resistors rated at ¼W are not listed herein.

ACCESSORIES GROUP

Ref. No.	Part No.	Part Name	Remarks
	2032101001	2P CONNECTOR CORD	
*	5118283002	INST. MANUAL	
*	5118284001	INST. MANUAL	EU only
⚠	**2033667007**	**PLUG ADAPTER**	**E1 only**

CARTON CASE GROUP

Ref. No.	Part No.	Part Name	Remarks
*	5018291071	CARTON CASE	
*	5018308074	CARTON CASE	EA only
	5038054007	PACKING	
	5038049009	SUB PACKING	EA only
	5058006048	ENVELOPE	

WARNING:
Parts marked with ⚠ and/or shading have special characteristics important to safety. Be sure to use the specified parts for replacement.

Remarks symbols in the parts list refer to the following countries and areas.
EA: Australia
EK: United Kingdom
EU: U.S.A.
E1: Multiple voltage model
E2: European continent

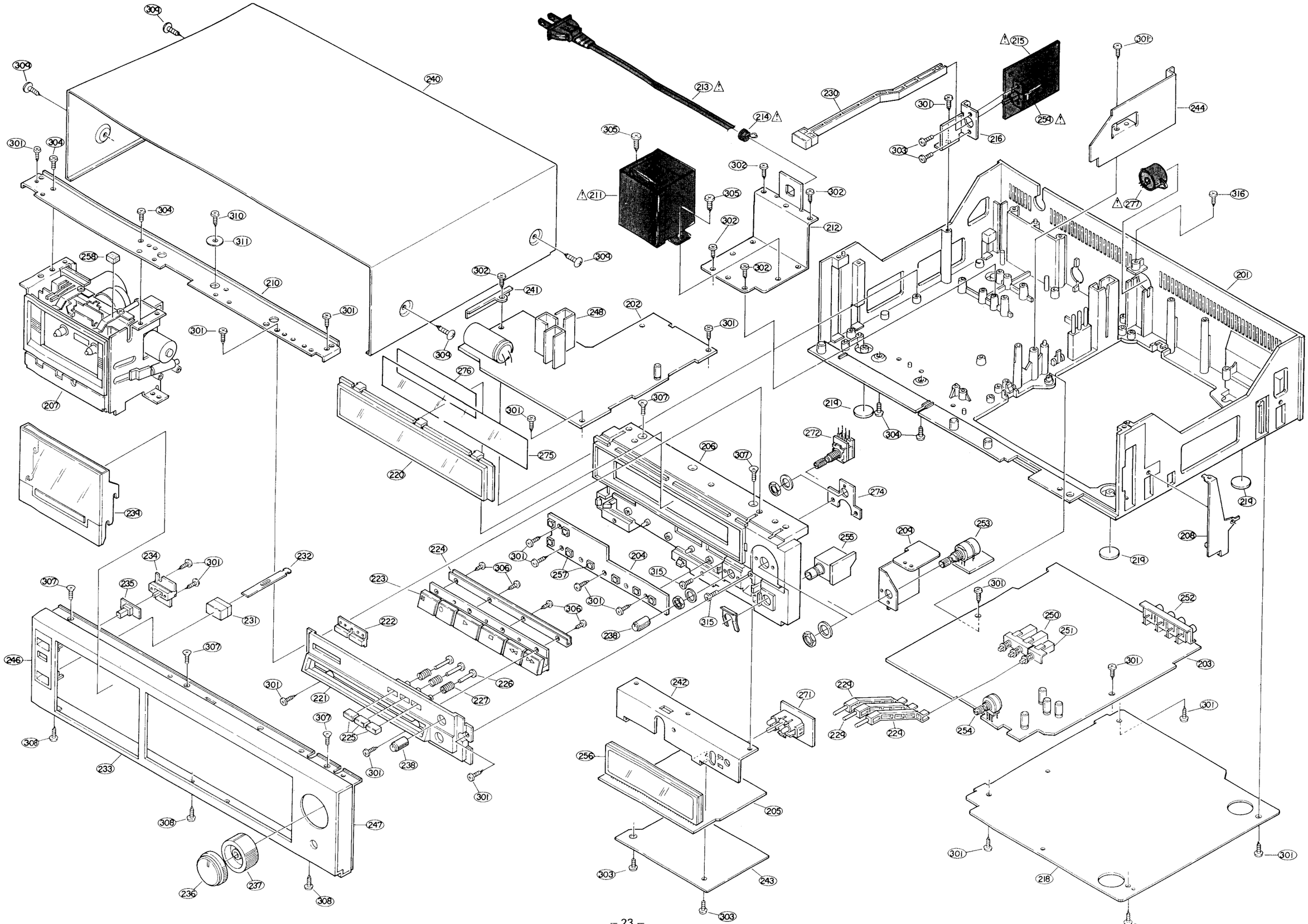
★ Remarks symbols (BK) in the parts list means that the color of the front panel is Black.

PARTS LIST OF EXPLODED VIEW

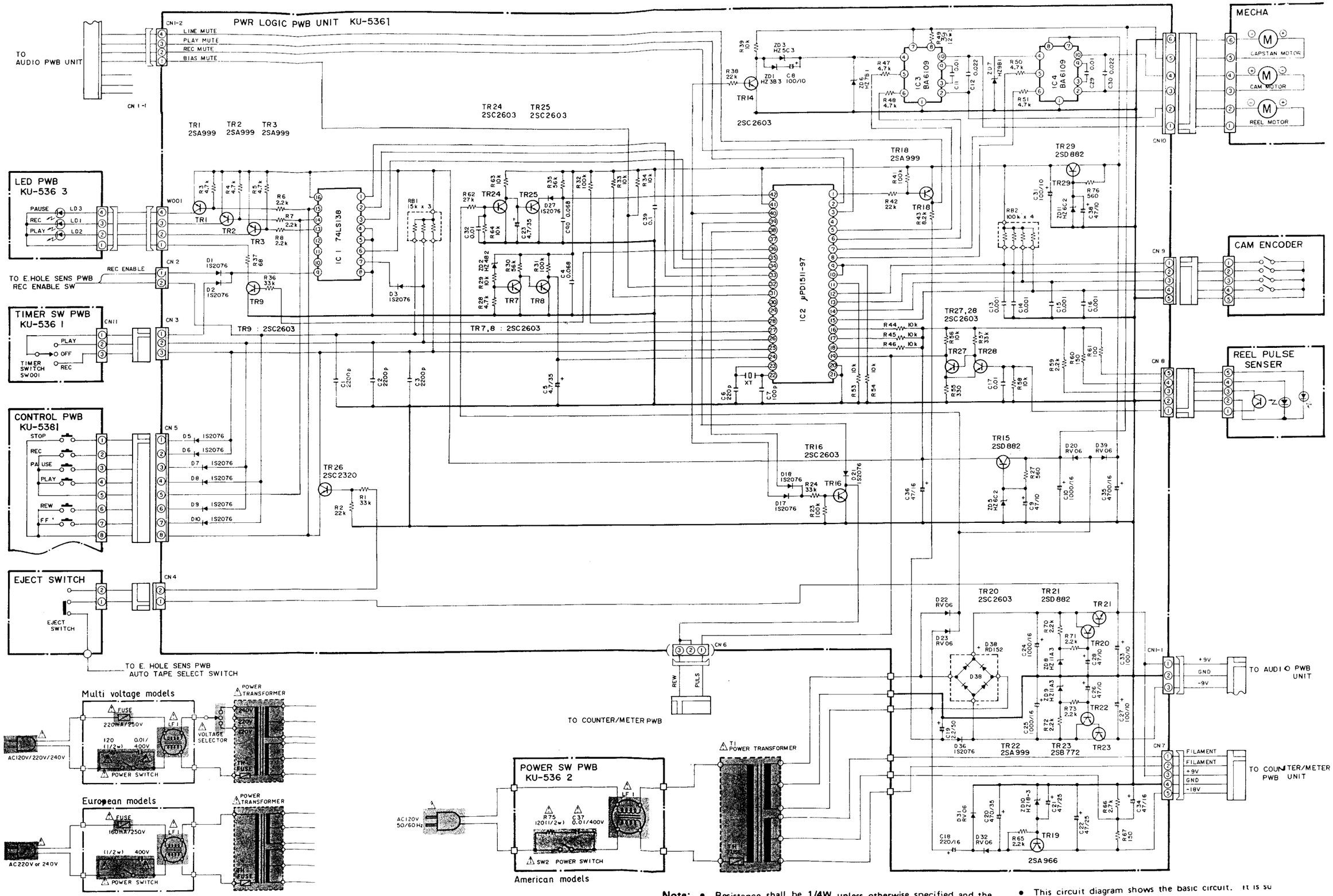
Ref. No.	Part No.	Part Name	Remarks
201	4118341602	CHASSIS	
	4118341615	CHASSIS	E1 only
*202	KU-5361	PWR LOGIC UNIT	
*203	KU-5350	AUDIO UNIT	
*204	KU-5381	CONTROL UNIT	
*205	KU-5371	COUNTER/METER UNIT	
*206	1038244316	FRONT CHASSIS	
*207	3388019008	V. MECHA 85 UNIT	
208	4118347101	EARTH PLATE (A)	
209	4148198003	SHIELD BRACKET (V)	
210	4118346115	ANGLE	
⚠ 211	2330750[illegible]	POWER TRANS	
	2330750[illegible]	POWER TRANS	EU only
	2330750[illegible]	POWER TRANS	E1 only
212	4118342410	TRANS BRACKET	
	4118342407	TRANS BRACKET	EU, E1 only
[illegible]	[illegible]	[illegible]	[illegible]
	KU-53612	[illegible]	
216	4118343202	POWER SW BRACKET	
217		—	
218	1058089108	BOTTOM COVER	
219	4610162004	FELT PAD	
*220	1438041012	METER WINDOW	
*221	1038264037	FRONT ESC ASS'Y	
	1038264024	FRONT ESC ASS'Y	BK
222	1138174111	PUSH KNOB (A)	
	1138174108	PUSH KNOB (A)	BK
223	1138175217	CONTROL BUTTON ASS'Y	
	1138175204	CONTROL BUTTON ASS'Y	BK
224	4118421001	PRESS BAR	
225	1138179019	PUSH BUTTON (A)	
	1138179006	PUSH BUTTON (A)	BK
226	1138180008	BUTTON SHAFT	
227	4638623004	SPRING	
228		—	
229	4318098108	PUSH SW LEVER	
230	4318101011	P.S. LEVER ASS'Y	
	4318101008	P.S. LEVER ASS'Y	BK
231	4318102010	EJECT KNOB ASS'Y	
	4318102007	EJECT KNOB ASS'Y	BK
232	4318104102	EJECT PLATE	
*233	1038248192	FRONT PANEL	
	1038248189	FRONT PANEL	BK
*234	KU-53611	TIMER SW PWB	
235	1138155143	SLIDE KNOB (B)	
	1138155130	SLIDE KNOB (B)	BK
236	1128112112	VOL. KNOB (A)	
	1128112109	VOL. KNOB (A)	BK

Ref. No.	Part No.	Part Name	Remarks
237	1128113111	VOL. KNOB (B)	
	1128113108	VOL. KNOB (B)	BK
238	1128114013	VOL. KNOB (C)	
	1128114000	VOL. KNOB (C)	BK
*239	1038253129	C. WINDOW ASS'Y	
	1038253103	C. WINDOW ASS'Y	BK
240	1028319248	TOP COVER	
	1028319235	TOP COVER	EA only
	1028319251	TOP COVER	BK
	1028319277	TOP COVER	BK, EA only
241	4428055002	P.W.B. SUPPORT	
*242	4428211202	METER HOLDER	
*243	4118450205	SHIELD SHEET	
244	4128747102	SHIELD BRACKET	
245		—	
246	1038249117	SIDE FRAME (L)	
	1038249104	SIDE FRAME (L)	BK
247	1038250119	SIDE FRAME (R)	
	1038250106	SIDE FRAME (R)	BK
248	4170140207	RADIATOR	
249		—	
*250	2129232003	PUSH SWITCH	
251	2129224008	PUSH SWITCH	
252	2048114008	4P PIN JACK	
253	2118075006	V1611V..503KA	50KΩA
254	2118076005	V2620V..103KA	10KΩA
255	2048109013	HEADPHONE JACK	
*256	3934010008	FL METER	
257	2124388004	TACT SWITCH	
258	1290024075	SOFT TAPE	
⚠ 259	2129136028	POWER SW	
*271	KU-53613	LED PWB	
272	2118077004	V.R. 500 ΩB	
*274	4428226103	BIAS ADJ PLATE	
*275	1298027014	COLOR FILTER	
*276	1290045007	COLOR SHEET	
⚠ 277	2123316023	VOLTAGE SELECTOR	E1 only
301	4737500015	3x8 CBTS (P)	
302	4737501001	3x10 CBTS (P)	
303	4713303016	3x6 CBS	
304	4737002005	3x6 CBTS (S)	
305	4737004003	4x8 CBTS (S)	
306	4737505007	2.6x8 CBTS (P)	
307	4737003004	3x8 CFTS (S)	
308	4737500044	3x8 CBTS (P) (B)	
309	4737503025	4x8 CTTS (P)	
310	4713305014	3x10 CBS	
311	4751106042	WASHER	
315	4713305014	3x10 CBS	
316	4730359014	3x16 CRTS (2)	E1 only

EXPLODED VIEW OF CABINET AND CHASSIS GROUP



SCHEMATIC DIAGRAM OF POWER AND LOGIC UNIT

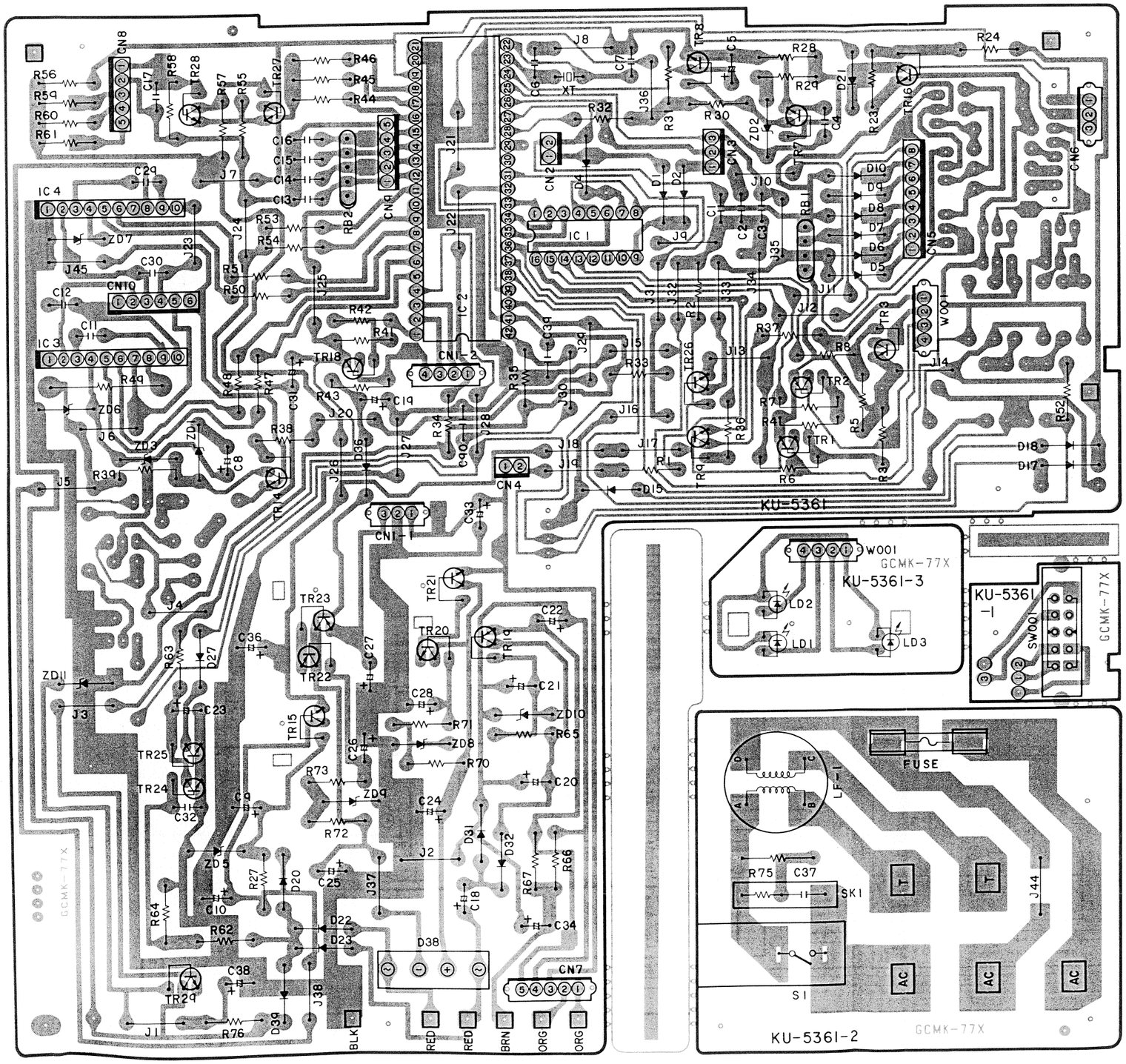


Note:

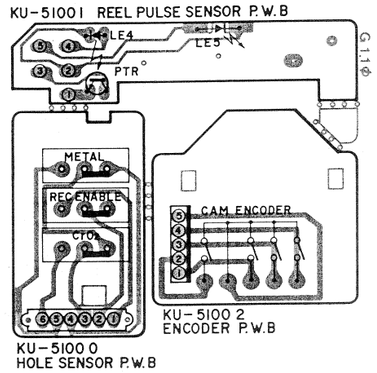
- Resistance shall be 1/4W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified
- This circuit diagram shows the basic circuit. It is so change for the purpose of improvement.
- Parts marked with ⚠ are of importance in respect to the safety, use the specified type without fail.

P.W. BOARD

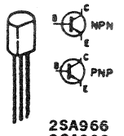
KU-5361 POWER AND LOGIC UNIT



KU-5100 MECHANISM UNIT



RV06



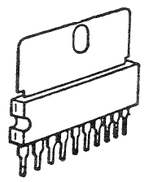
2SA966
2SA999
2SC2603

1S2076

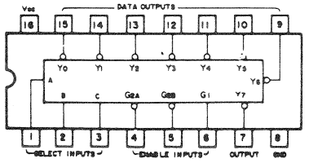
HZ3B3
HZ4B2
HZ5C3
HZ6B2
HZ6C2
HZ7B1
HZ9B1
HZ11A3
HZ18-3

2SB772
2SD882

RB152

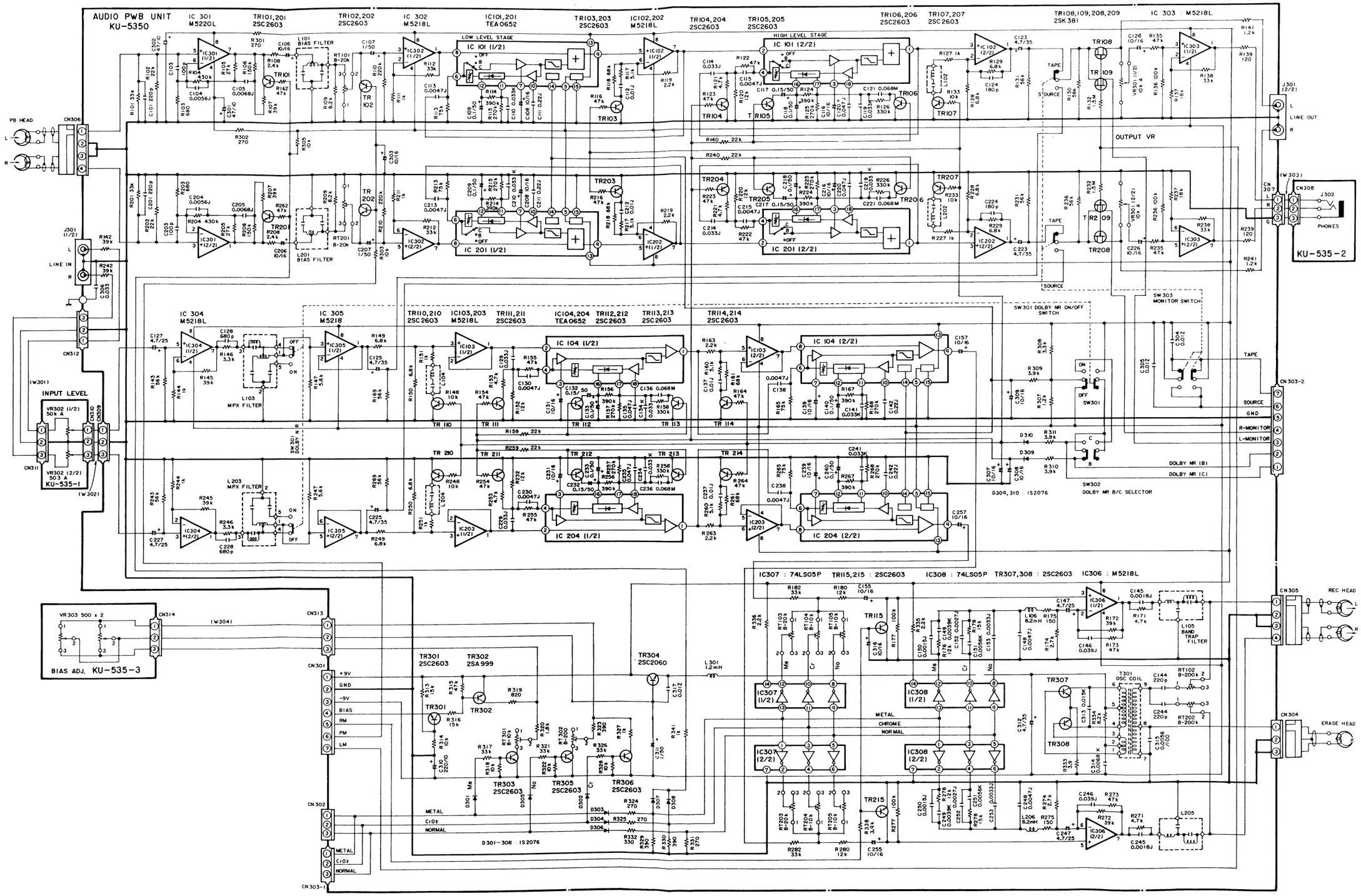


BA6109



HD74LS138P

SCHEMATIC DIAGRAM OF AUDIO AMP UNIT

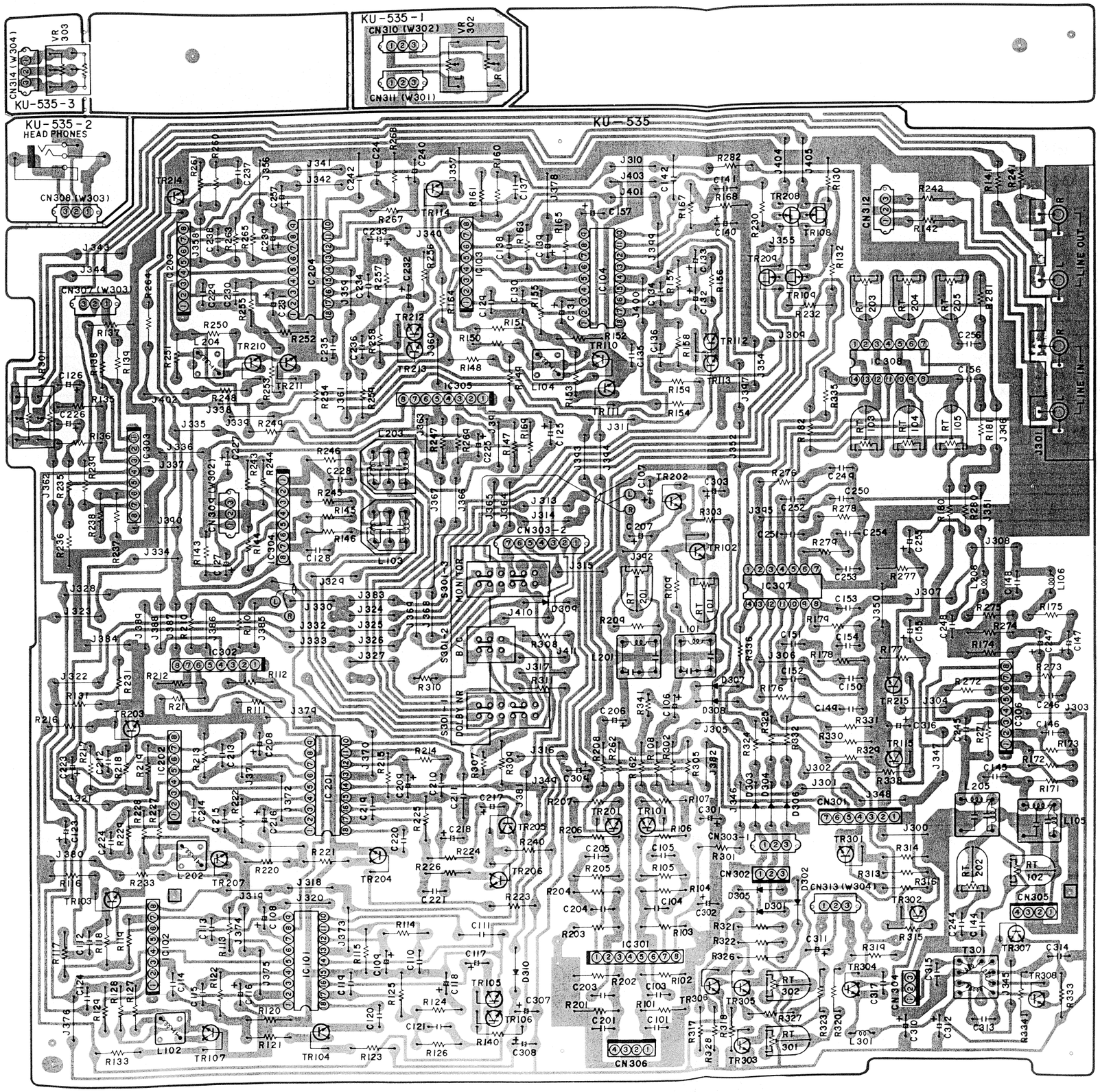


Note:

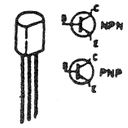
- Resistance shall be 1/4W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified.
- This circuit diagram shows the basic circuit. It is subject to change for the purpose of improvement.

P.W. BOARD

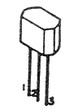
KU-5350 AUDIO AMP UNIT



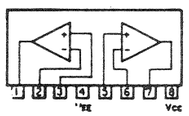
1S2076



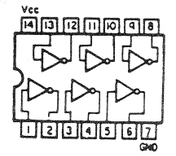
2SA999
2SC2603
2SC2060
2SC2320



2SK381

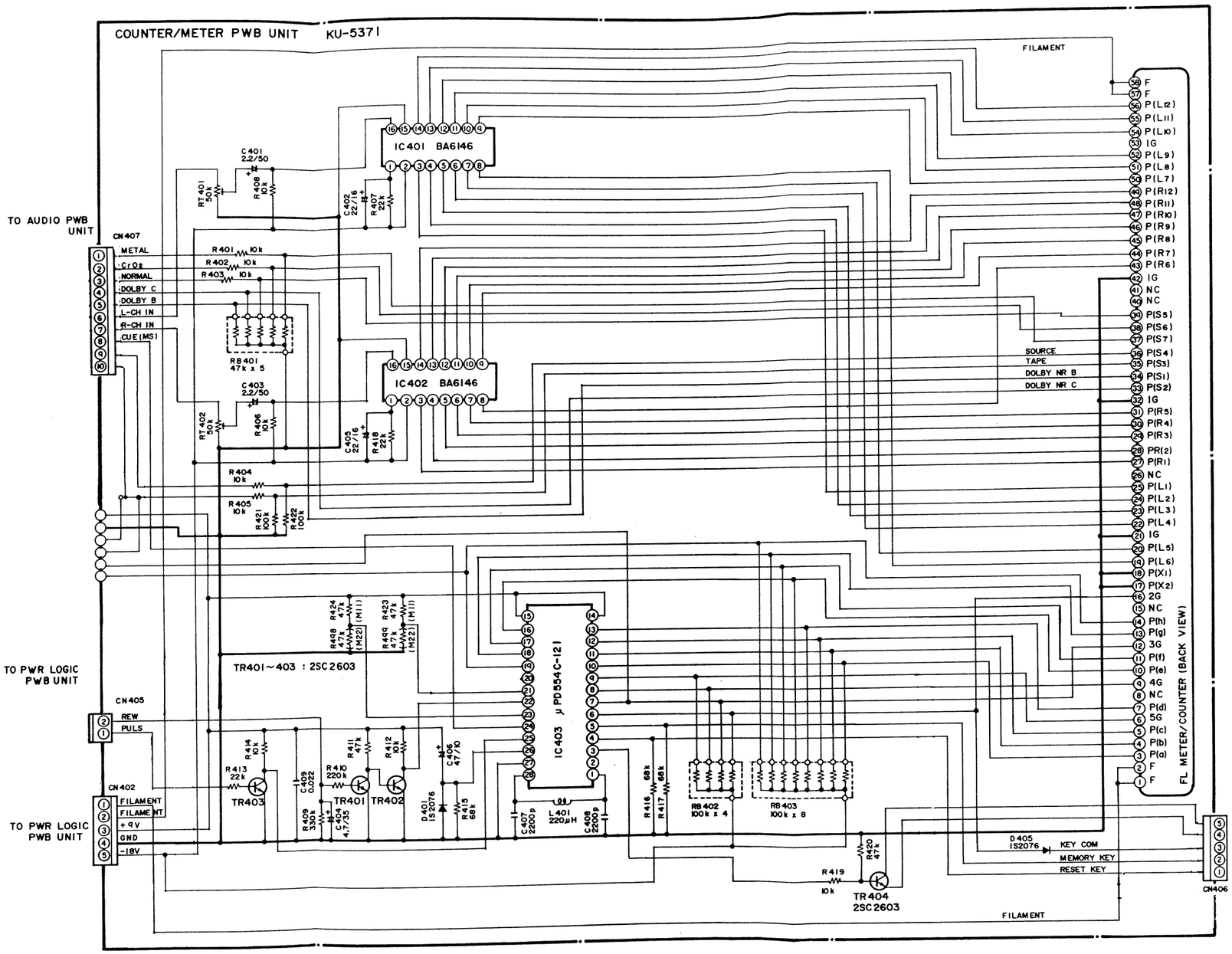


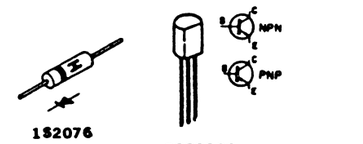
M5218L
M5220L

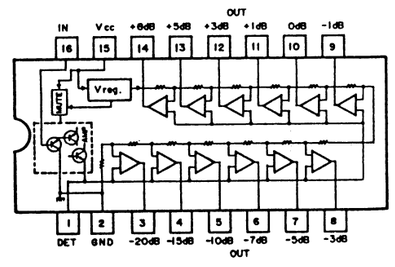


HD74LS05P

SCHEMATIC DIAGRAM OF COUNTER METER UNIT



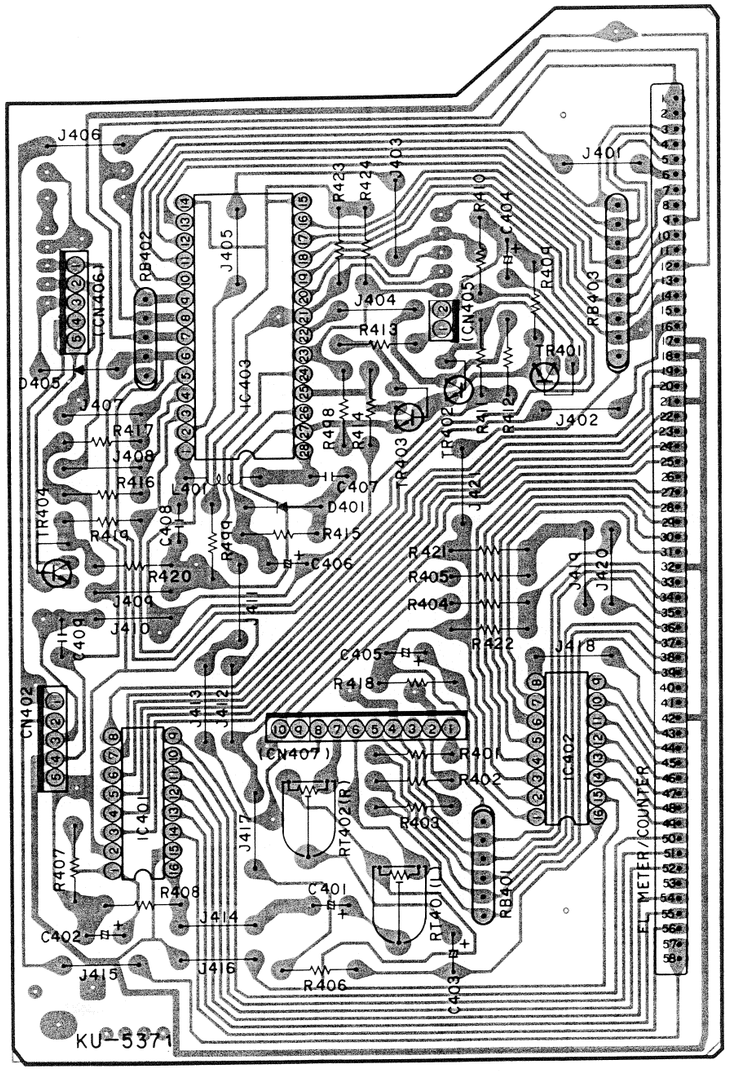




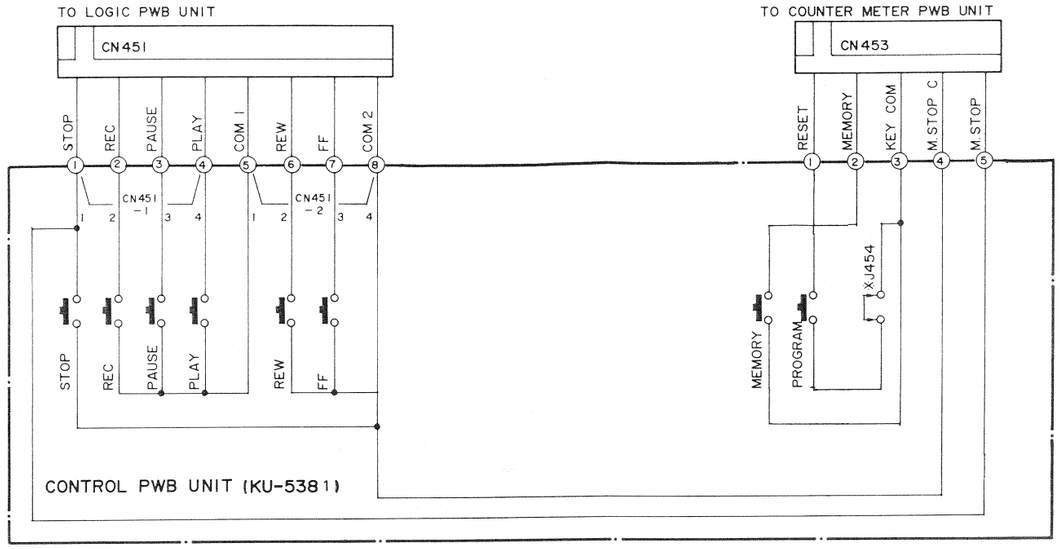
Note:
- Resistance shall be 1/4W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified.
- This circuit diagram shows the basic circuit. It is subject to change for the purpose of improvement.

P.W. BOARD

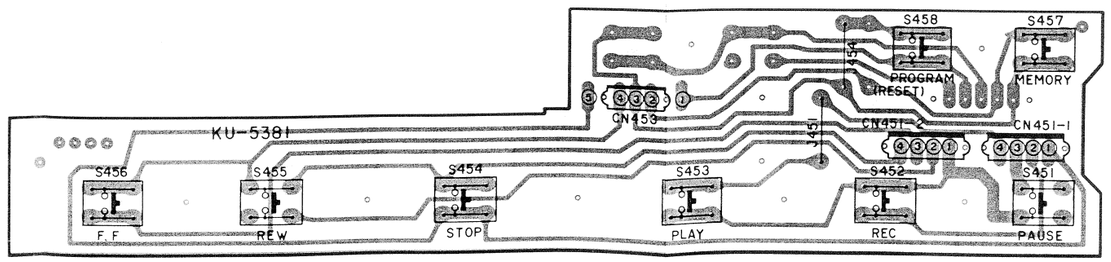
KU-5371 COUNTER METER UNIT



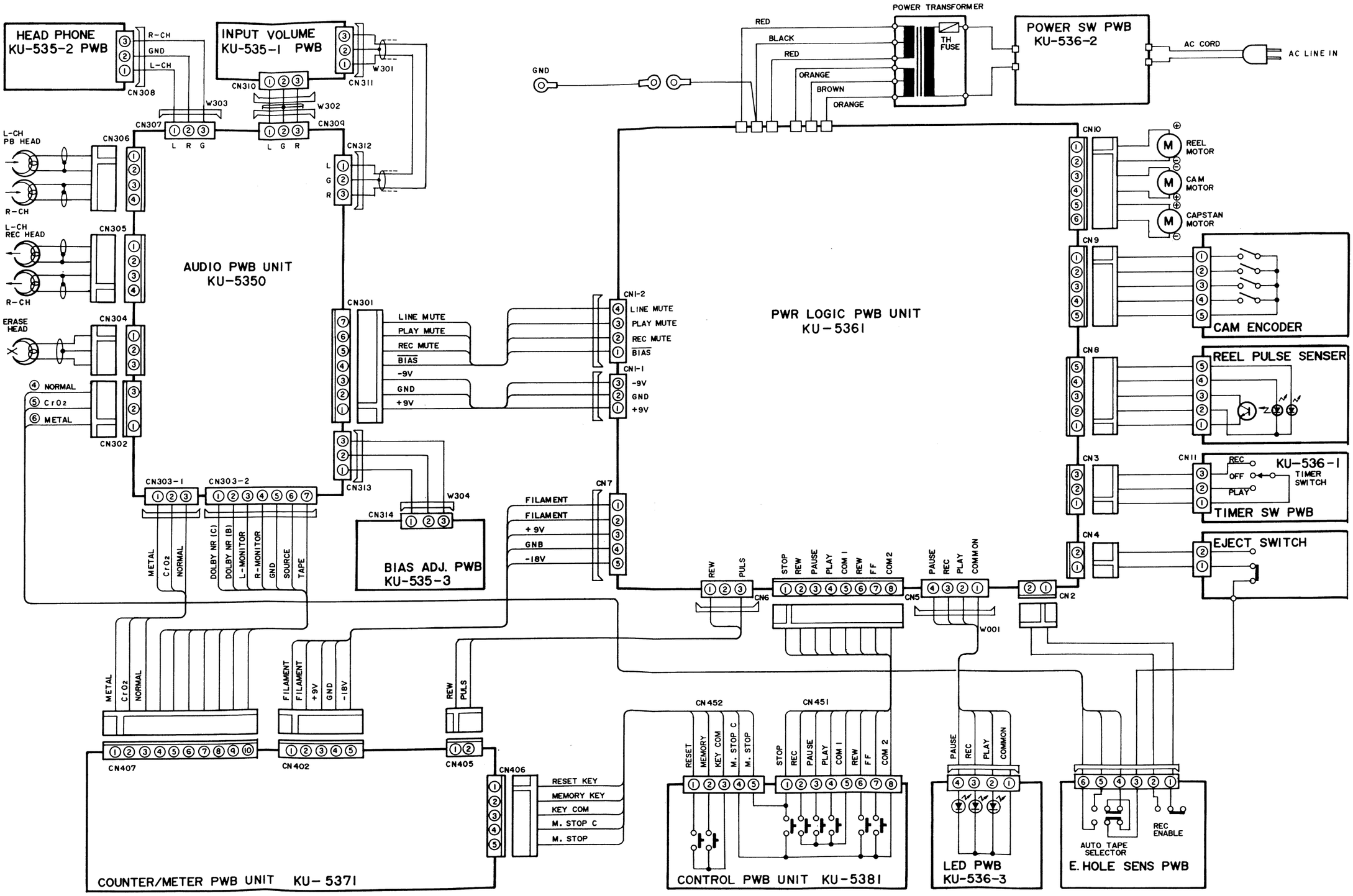
SCHEMATIC DIAGRAM OF CONTROL UNIT



KU-5381 CONTROL UNIT



CONNECTIONS OF P.W. BOARD



KU-5361 POWER AND LOGIC UNIT

Ref No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC1	2620427003	HD74LS138P	
IC2	2620408006	μPD1511C-097	
IC3, 4	2620447009	BA6109U1	
TR1~3	2710113010	2SA999 (F)	
18, 22			
TR7~9	2730245007	2SC2603 (E/F)	
14, 16			
20			
24~28			
TR19	2710105002	2SA966 (Y)	
TR15, 21	2740078031	2SD882 (Q/P)	
29			
TR23	2720055029	2SB772 (Q/P)	
D1~3	2760049008	1S2076	
5~10			
17, 18			
21, 27			
36			
D20	2760237001	RV06	
22, 23			
31, 32			
39			
D38	2760246005	RB152	
ZD1	2760299052	HZ3B3	
ZD2	2760185027	HZ4B2	
ZD3	2760236057	HZ5C3	
ZD4	2760173039	HZ6B2	
ZD5, 11	2760303003	HZ6C2	
ZD6	2760051041	HZ7B1	
ZD7	2760218046	HZ9B1	
ZD8, 9	2760052082	HZ11A3	
ZD10	2760249015	HZ18-3	
RESISTOR GROUP			
⚠R75	2410163001	RD14B2H121J	120Ω 1/2W
R49	2440081027	RS14B3D390JNBF	39Ω 2W
RB1	2462011088	RK99=2B153MP3	15KΩx3 1/8W
RB2	2462010092	RK99=2B104MP4	100KΩx4 1/8W
CAPACITOR GROUP			
			Ceramic
C1~3	2531022005	CK45F1H222Z	0.002μF 50V
C11, 17	2531024003	CK45F1H103Z	0.01μF 50V
29, 32			
C12, 30	2531025002	CK45F1H223Z	0.022μF 50V
C4	2539014002	CK45=1E683M	0.068μF 25V
C13~16	2531004007	CK45B1H102K	0.001μF 50V
C90	2539014002	CK45=1E683M	0.068μF 25V
C39	2539015001	CK45=1E104M	0.1μF 25V
C7	2533627000	CC45SL1H101J	100PF 50V
C6	2533635005	CC45SL1H221J	220PF 50V
⚠C37	2538010007	CK45=2GAC103P	0.01μF 400V AC

Ref No.	Part No.	Part Name	Remarks
			Electrolytic
C9	2544129005	CE04W1A470=	47μF 10V
26, 28			
34, 38			
C8, 27	2544130007	CE04W1A101=	100μF 10V
31, 33			
C36	2544135002	CE04W1C470=	47μF 16V
C18	2544163003	CE04W1C221M	220μF 16V
C10	2544163032	CE04W1C102M	1000μF 16V
24, 25			
C35	2542078006	CE02W1C472M	4700μF 16V
C21, 22	2544138009	CE04W1E470=	47μF. 25V
C5, 23	2544140000	CE04W1V4R7=	4.7μF 35V
C20	2544165014	CE04W1V471M	470μF 35V
C19	2544147003	CE04W1H2R2=	2.2μF 50V
OTHER PARTS GROUP			
CN1	2045408018	7P EI CON WITH WIRE	
CN2, 4	2032075001	2P CONNECTOR BASE	
CN3	2035622008	3P MINI CONNE PIN	
CN5	2035622037	8P MINI CONNE PIN	
CN6	2031638067	2PEI CON WITH WIRE	
CN7	2041630039	5P EI CON WITH WIRE	
CN8, 9	2035622066	5P MINI CONNE PIN	
CN10	2035622082	6P MINI CONNE PIN	
CN11	2035691013	3P EI CON WITH WIRE	
	2050185038	3P WIRE HOLDER	
	2050185041	4P WIRE HOLDER	
	2050185054	5P WIRE HOLDER	
CM1	3998031007	CERAMIC RESONATOR	
SW1	2129188005	SLIDE SWITCH	
LD1	3939180001	LED	Red
LD2	3939182009	LED	Green
LD3	3939181000	LED	Amber
	4438875201	LED GUIDE	
	4428055002	P.W.B SUPPORT	
⚠SW1	2129136028	POWER SW	
⚠LF1	2398019002	LINE FILTER COIL	
⚠	FEP1287	FUSE HOLDER	Except Eu
⚠	2061031032	FUSE 0.16A	Except Eu
⚠	2061031045	FUSE 0.25A	EI only
	4118343202	POWER SW BRACKET	

• The carbon resistors rated at ¼W are not listed herein.

WARNING:
Parts marked with ⚠ and/or shading have special characteristics important to safety. Be sure to use the specified parts for replacement.